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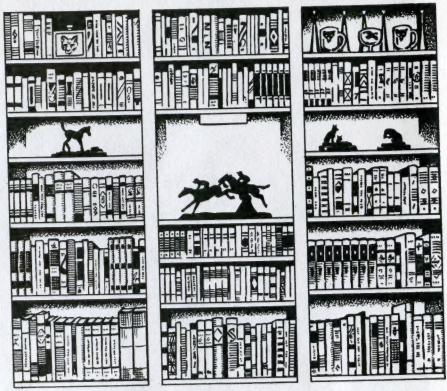

Ex Libris

JOHN AND MARTHA DANIELS

THE

ART

OF

SHOOTING FLYING.

Boyd

THE ART OF SHOOTING FLYING.

CONTAINING

DIRECTIONS

FOR THE

CHOICE OF GUNS:

EXPERIMENTS

DISCOVERING THE

EXECUTION OF BARRELS

OF DIFFERENT LENGTHS AND BORES

With many useful Hints for the

IMPROVEMENT OF YOUNG PRACTITIONERS,

ENTIRELY NEW.

To which is now added, the

METHOD OF TRAINING, BREAKING AND USING

POINTERS AND SPANIELS;

RULES FOR PRESERVING OF THEIR HEALTH;

RECEIPTS FOR THE DISORDERS THEY ARE

LIABLE TO.

ALSO

ABSTRACTS OF THE LATE

ACTS OF PARLIAMENT CONCERNING

G A M E.

SHEWING THE

SPORTING SEASONS,

AND

TIMES FOR KILLING GAME.

LIKEWISE THE

D O G A C T.

WITH AN INDEX TO THE WHOLE.

By T. PAGE, NORWICH.

THE SEVENTH EDITION, WITH ADDITIONS.

LONDON:

PRINTED FOR SCATCHERD AND WHITAKER, SUCCESSORS TO E. JOHNSON, No. 12, AVE-MARIA-LANE.

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1767

Advertiſement.

THE author has been obliged to many experienced ſportſmen for their favourable commendations of the firſt edition of this pamphlet; and, at the requeſt of ſeveral, has here added ſome account of the compoſition and qualities of gunpowder: alſo a method of finding the relative velocities of ſhot from guns of different lengths and bores to one another, and their abſolute velocities; ſo that the goodneſs of barrels, in regard to carrying the ſhot with force, needs be no longer a diſputable point, as every one will hereby be enabled to prove it with as much exactneſs as he can deſire.

Here is an account of various experiments made for that purpoſe; alſo the reſiſtance of the air is conſidered on ſhot of different ſizes. All algebraic ſymbols are avoided, ſince it is more convenient, for the uſe of moſt readers, to put, inſtead of ſuch marks, words at length; and it is hoped the whole is now explained in ſo eaſy a manner, as will be compre-

comprehended by thoſe who are not acquainted with mathematical operations.

As the writer of the following letter to the author ſeems to be of a different opinion from him with regard to the proper ſize of ſhot, it is publiſhed in hopes that this diſputable point is ſatisfactorily diſcuſſed at the latter end of the appendix, where the reſiſtance of the air on different ſurfaces is treated of.

LET-

LETTER TO THE AUTHOR.

SIR,

HAVING juſt peruſed your Treatiſe upon the Art of Shooting Flying, I trouble you with this to thank you for the pleaſure it gave me. What you recommend with regard to the lengths and bores of guns, as alſo the method of loading, correſponds nearly with what experiments had taught me was moſt effectual. The quantities of powder and ſhot I uſe are the ſame; but inſtead of No. 4, I ſhoot at all kinds of game with No. 6, about 340 of which make an ounce, and kill, I think, with more certainty than larger, as there is the greater chance ſome ſhot will ſtrike the mortal part, and with force ſufficient; for I am of opinion that nine out of ten birds are killed within thirty yards of the gun, notwithſtanding you ſo frequently hear of ſhoots at a much greater diſtance. You hit your mark indeed with larger ſhot, but if you do not touch the head, the wings, or the thin part of the ſide, which

which is only expoſed to you in croſs ſhoots, the bird, however wounded in the thighs, or the more fleſhy part of the belly, eſcapes you, and lives, or dies in miſery.

I am, Sir, &c.

R. BROCKLEBANK.

CHAPELTHORPE, near Wakefield,
Yorkſhire, *June* 23, 1767.

THE

THE

ART

OF

SHOOTING FLYING.

FRIENDLY.

MR. Aimwell, your ſervant. I think it is as great a rarity to find you abroad, as it is ſome people at home; and yet you often talk of ſhooting, but I don't ſee when you find leiſure.

AIMWELL.

The nature of my buſineſs, Sir, requires as much application of my hands as poſſible. 'Tis true I am fond of ſhooting, and perhaps the more ſo, as the exerciſe has been of great uſe to me, in carrying off ſome diſorders which are frequently the conſequence of too cloſe application to a ſedentary buſineſs; ſo that I think four or five hours in a week ſpent in this diverſion is not thrown away, as it ſeems to give new vigour to the animal ſpirits, and enables me to return to buſineſs with greater chearfulneſs.

FRIENDLY.

What you say seems very reasonable. I have thought, for some time, a little of this exercise might afford me the like relief from study, as it does you from business; so that I have now prevailed on my father to indulge me in it, and am come with a design to purchase a gun of you.

AIMWELL.

Sir, I much commend your prudence in consulting your father, and waiting for his approbation; it seems to promise that you will not abuse this indulgence to the hindrance of your study, or hurt of your constitution: for most things, and even the best, may, and do often become detrimental when used to excess.

FRIENDLY.

I think myself obliged for this hint, which shall not be lost on me. But I have something more to claim from an old promise, which I shall esteem a particular favour; that you will give me some instructions in the art of shooting flying, that I may be able to use the instrument I am going to purchase to your credit as well as my own.

AIMWELL.

Sir, the respect I bear to you and your family will readily dispose me to any thing in my power to serve you; and as you are come to spend some weeks here, now the shooting season is just coming on, I don't doubt but, if you will submit yourself entirely to my directions, I shall put you in a method, by which you may with practice become a marksman. But to attain that must be a work of time. I assure you, from the little leisure I had to practise, it was ten years before I became a tolerable marksman; though, indeed, I had not the advantage of a good instructor. But from the

the experience I have had, I hope to put you in a readier way to this attainment.

FRIENDLY.

I shall be greatly obliged to you. But as to the gun, what length of barrel would you advise to begin with?

AIMWELL.

It is necessary for any gentleman who sports much to have two guns: the barrel of one about two feet nine inches, which will serve very well for the beginning of the season, and for wood-shooting; the other about three feet three inches, for open shooting after Michaelmas: the birds by that time are grown so shy, that your shoots must be at longer distances. But if you intend one gun to serve for all purposes, then a three feet barrel (or thereabouts) I think most proper.

FRIENDLY.

I have heard some of my acquaintance talk of guns of two feet six inches in the barrel that will kill at fifty or sixty yards. Nay, I heard one assert, that he threw six shot into a quarter of a sheet of paper at a hundred yards distance.

AIMWELL.

Well, Sir, I am not surprized you have heard of these great things. I am frequently told stories to the same purpose. But there is nothing gentlemen seem more prone to than imposing on themselves and others in the distances they shoot at. I know you have a taste for mechanical experiments, and therefore don't doubt but you will make use of that way of reasoning, as a standard to regulate your judgment at the first setting out, in this as well other branches of knowledge. And tho' in this art every thing will not admit of mathematical demonstration; yet I shall not demand your assent, but as it shall appear reasona-

ble from experiments; and hope you will not forget something that is similar to it when you become a teacher of men. If you can call on me by six in the morning, I will attend you to a proper place, and try some experiments of guns of different lengths, to give you a sufficient idea of what can be done by guns in general, and to prevent your being imposed on by every idle prater on this head.

FRIENDLY.

I am already obliged for the favour of this conversation, and will attend at your time; 'till when, adieu!

AIMWELL.

Your servant.

DIALOGUE II.

FRIENDLY.

GOOD-MORROW, Mr. Aimwell.

AIMWELL.

Sir, I hope you are well. You are very punctual, to be here rather before the time appointed.

FRIENDLY.

I knew you were an early riser, and am desirous you should think me diligent to receive your instructions; but am ready to wait your leisure.

AIMWELL.

Sir, it gives me pleasure to see you so alert: for as to sluggards, there is nothing to be made of them. But come, Sir, I am ready. I see you have brought your servant with you, whose attendance may be useful, and I have a man who is a very good hand at shooting at a dead mark; for

For my part, I am not fond of it, for guns seem to recoil more at a fixed mark than at a flying object; and I am apt to lay my face so close as to get a smart blow on the cheek-bone, especially if the barrel lies too strait in the stock. I have chose several guns, from two feet six inches to three feet six inches, which I think is the greatest variety requisite for shooting flying. And here comes my man with a quire of large brown paper, chalk, a hammer and nails. Please to let your servant take some of the guns, and pen, ink and paper, for you to take down what I shall direct.

FRIENDLY.

Is it far to this place?

AIMWELL.

We are just by it: you see my man who went before is nailing up a sheet of paper, and has chalked a place in the middle of it to take aim at.

FRIENDLY.

But pray of what use are those long splines?

AIMWELL.

They are two ten-feet splines, for the greater ease and exactness of measuring the distances we shall try the guns at. He has measured the distance of six splines, and put down a mark there for twenty yards. Now, Sir, if you will pass over this distance two or three times, till you can do it pretty exactly at twenty paces, and the same when he has measured thirty, forty, and fifty yards, it will be of great use to you by and by, to learn to judge of the true distances you shoot at; and therefore you may practise the like whenever you have opportunity.

FRIENDLY.

Pray what is your method of loading? I have been told that gunsmiths in general put in a large quan-

quantity of ſmall ſhot, to make them fill the paper well that they ſhoot at.

AIM WELL.

'Tis very true, indeed, they are often obliged to it, when gentlemen won't be ſatisfied with what is reaſonable for a gun to do; and it is a common practice in this country to load with a pipe bowl of powder and a bowl and a half of ſhot; and when they find they can't kill often, think they don't put ſhot enough, ſo put in more, and are obliged to leſſen the quantity of powder to prevent its recoiling; not conſidering this axiom, "that action and re-action are equal"—that upon diſcharge of powder the gun is forced back, as the ſhot is forwards, in proportion to the weight of ſhot to the weight of the gun; ſo that by putting in a larger load of ſhot, and leſs powder, you will be ſtruck more, and the bird you ſhoot at leſs; ſo that though you put many ſhot into the bird, they will not have force enough to kill, unleſs at a very ſhort diſtance. I have been told, by a gentleman who is reputed to ſhoot very well, that when he is diſpoſed to kill at very long ſhoots, he puts in a leſs quantity of ſhot than powder, becauſe he thus finds them more efficacious. But if leſs of ſhot than powder will carry the ſhot cloſe enough for long ſhoots, they will certainly fly thick enough at ſhorter diſtances. To avoid the extremes, I uſe the beſt powder, and put in equal meaſures of that and ſhot, which in weight is nearly as one to ſeven, but uſually prime out of that quantity. To a barrel of a middle-ſized bore, whoſe diameter is about five-eighths of an inch (which I look upon to be the beſt ſize for ſhooting flying) I put in two ounces of ſhot, No. 4, which are about 200 in an ounce, and an equal meaſure of powder. This is the charge I uſe in the field, and ſhall make

uſe

uſe of the ſame in our trial: for it is prepoſterous to make uſe of a load expected to make a better ſhoot at a mark, than when you deſign to kill a bird.

FRIENDLY.

And what ſort of wadding do you beſt approve of? I have heard ſome ſay that tow is beſt; others cards ſtamped, to fit the ſize of the bore.

AIMWELL.

Tow, I think, is uncertain. If cards be uſed, the end of your rammer muſt be almoſt as broad as your barrel will admit of, to go down free, and quite flat at the end, to prevent the card from turning; and muſt be puſh'd down gradually, to give time for the air to paſs, otherwiſe it will be troubleſome. This is therefore not the quickeſt way. Old hat may be uſed in the ſame manner, which is rather better: and ſome ſay leather ſhreds are beſt. But I cannot yet find any thing better, or ſo ready as thin brown paper rubbed ſoft, and cut into pieces about one inch broad and two inches long; ſo that when it is once doubled, it is an inch ſquare. I punch a ſmall hole at the corner of each piece, put a ſufficient quantity upon a key-ring, hang them into my button hole, and tear off one as I want it. This being doubled, put it to the muzzle, and cloſe the corners up about your rammer (the end of which ought to continue of the ſame bigneſs for at leaſt half an inch, or rather ſomewhat ſmaller juſt at the end) and thruſt the paper thus put into the barrel gently down upon the powder. Your rammer will come back without danger of drawing the paper back, and will leave it cloſed againſt the ſides of the barrel, like a half cartridge. Put in another in the ſame manner after the ſhot. When your gun is quite clean, it is neceſſary to put in a

ſecond

ſecond wad after the ſhot, to prevent its getting looſe.

FRIENDLY.

Do you ram your ſhot as much as your powder? I think I have heard ſome that pretend to experience ſay, that they ram the powder well but not the ſhot. What is your opinion of this?

AIMWELL.

After ſome experience you will find, if your gun is clean, and the wad thruſt but lightly down, that in walking the ſhot will be apt to get looſe: and if you diſcharge the piece in that ſtate, it will ſeem, by the ſmall reſiſtance it makes, as if there were no ſhot in it: and if you try one load pretty ſmartly rammed over the ſhot, and another with the wad thruſt but lightly down, at a quire of paper, you will find the charge that is rammed will penetrate deepeſt, and that the ſhot will fly as regularly as the other which is not rammed.

FRIENDLY.

Well, Sir, it ſeems rational enough; and I ſhall follow your counſel, and try it the firſt opportunity, becauſe I think it a point neceſſary to be thoroughly convinced of.

AIMWELL.

No. 1. The gun two feet ſix in the barrel is loaded; you ſee I have got a reſt to be the more exact in our trials: fire it at twenty yards.—Well ſhot.—Bring the paper this way, and draw three or four lines acroſs it with your chalk there. By this means you may eaſily count the ſhot holes; which pleaſe to do whilſt I load it again, and put down.—The gun two feet ſix inches long, the barrel ſix tenths and a half diameter, weight two pounds fourteen ounces, and weight of the whole gun ſix pounds two ounces;

The

The firſt ſhot at 20 yards,	196	Med.	208
Second at ditto ——	220		
Firſt of ditto, at 30 yards,	104		94
Second at ditto ——	84		
Firſt of ditto, at 40 yards,	35		29
Second at ditto ——	29		
Firſt of ditto, at 50 yards,	16		20
Second at ditto ——	24		

By the ſhoots made with this gun, you may eaſily perceive it is difficult to make two ſhoots alike: and therefore no certain judgement can be made of its goodneſs by two or three ſhoots. For inſtance, the ſhoots here made at forty yards, are not much above half the number of ſhot there ought to be in proportion to thoſe at twenty and fifty yards, as you will ſee upon further trials.

No. 2. A barrel two feet nine inches, weight three pounds two ounces, weight of the whole gun ſix pounds five ounces; bore, ſix tenths and a quarter.

Firſt ſhot, at twenty yards	218	Med.	220
Second at ditto ——	222		
At thirty yards ——	115		119
Ditto ——	123		
At forty ——	68		64
At ditto — —	94		
Ditto with hat wad ——	62		
Ditto, at fifty ——	40		38
Ditto — —	36		

The powder and ſhot took up two diameters and three quarters each in the barrel.

No. 3. Of a gun whoſe barrel is three feet long, and two pounds fifteen ounces weight, the bore is ſix tenths and a half of an inch diameter, and is nearly a cylinder, 'till within three inches of the muzzle, which is opened a little; the weight of the whole gun five pounds thirteen ounces.

First shot, at twenty yards,	238	Med.	229
Second at ditto — —	220		
First, at thirty yards —	48		54
Second, at ditto ——	60		
First, at forty yards —	36		53
Second, at ditto —	50		
Third, at ditto ——	40		
Fourth, at ditto ——	86		
First, at fifty ——	40		43
Second, at ditto ——	46		

No. 4. Of another gun, barrel three feet long, and six tenths and three quarters diameter; weight three pounds three ounces; and whole weight of the gun six pounds six ounces.

First shot, at thirty yards,	120	Med.	125
Second, at ditto —	130		
First, at forty yards —	45		45
Second, at ditto ——	46		
First, at fifty yards ——	26		32
Second, at ditto ——	38		

No. 5. Of a gun the barrel three feet and two inches long, the bore six tenths and three quarters diameter; two ounces of shot loaded it two diameters, and the same quantity in measure of powder; weight of the barrel three pounds twelve ounces; the whole gun seven pounds three ounces.

First shot, at twenty yards	216	Med.	260
Second at ditto — —	304		
First, at thirty yards —	142		122
Second, at ditto ——	96		
Do. without any wad betwixt shot and powder ——	129		

First,

First, at forty yards —	94	
Second, ditto ——	60	
Do. with four hat wads betwixt the powder and shot ——	70	Med. 79
Do. with a single wad betwixt powder and shot ——	94	
First ditto, at fifty yards	32	
Second ditto ——	52	52
Third ditto — —	74	

No. 6. Of a gun three feet and six inches; its barrel to weigh three pounds six ounces; weight of the whole gun six pounds eight ounces; two ounces of shot, and the same quantity of powder loaded it, two diameters of each.

At thirty yards ——	146	
Ditto — ——	177	
Ditto —— —	116	Med. 148
Ditto without wad over the shot ——	154	
Ditto, at forty yards —	60	
Ditto ——	94	
Ditto — ——	101	
Ditto — ——	70	82
Ditto ——	84	
Ditto with a double wad	86	
At fifty yards ——	34	
Ditto —— —	31	33
Ditto — ——	33	

No. 7. A barrel three feet three inches long, weight three pounds twelve ounces, tried in a rough stock.

At thirty yards — —	144		144
At forty yards —	59	Med.	76
Ditto with a hat wad —	94		
At fifty yards ——	33		38
Ditto — —	44		

No. 8. Another barrel three feet three inches long,

long, weight three pounds seven ounces, and was fine bored; tried in the rough stock.

At forty yards —	94		
Ditto — —	100	Med.	96
Ditto with a hat wad	95		

No. 9. A five feet barrel of the same bore and lead.

At fifty yards —	53		
At ditto ——	64	Med.	58

No. 10. A real Spanish barrel three feet eight inches long.

At thirty yards ——	110		
Ditto —	96	Med.	103
At forty yards —— — —			60
At fifty yards —— — —			25

The owner of this gun shoots well, and he says he frequently kills with it at seventy yards; but unless he puts in more powder and shot, I think there is but little chance for killing at fifty yards with any certainty.

No. 11. One ditto three feet two inches seven tenths diameter.

At forty yards — —			77
At fifty — — —			28

No. 12. A four feet barrel, six tenths and a half diameter.

At forty yards — —	84		
Ditto —	58	Med.	71
Ditto ——	73		

Ditto, after cutting eight inches off the barrel,

At forty yards —	50		
Ditto — —	32	Med.	45
Ditto —	54		

Upon supposition that a gun loses half the quantity of shot every ten yards, (and it appears from the experiments to be nearly so) this gun has lost about a yard distance in killing, to one

one inch taken off from the length of barrel; but the difference of the force with which the ſhot were thrown was ſcarcely diſtinguiſhable.

No. 13. The ſecond beſt barrel, three feet three inches, Spaniſh faſhion, fixed into a block.

At forty yards	71
Second ditto	62
Third ditto, card over the powder, and paper over the ſhot	39
Fourth, without any wad over the powder	70
Fifth ditto, more wad over the ſhot	85
Sixth ditto, double wad over ſhot and powder	56

There were at the firſt three ſhoots put into a round target, of three feet diameter, which the papers were nailed to 426

The laſt three ſhoots, which were made on the other ſide the target, and the ſhot ſeemed to be thrown in with nearly the ſame force on each, 471

No. 14. A barrel, Spaniſh faſhion, weight four pounds two ounces; three feet ſix inches long.

At forty yards	75

No. 15. A barrel, Spaniſh faſhion, weight three pounds four ounces; three feet ſix inches long.

At thirty yards	110 } Med. 113
Ditto at ditto	116 }
Ditto at forty	64

AIMWELL.

It appears from various other trials beſide theſe, which I have made, that the ſhot fly as regularly, or more ſo, and with as much force, without any wad betwixt the powder and ſhot, as it does with wad, only it is difficult to keep the ſhot from mixing with the powder, and when they do that will affect it: but it proves thus much at leaſt, that it does not ſignify how thin your wad is betwixt the powder and ſhot, ſo it does but keep them

them from mixing. But the ſhot fly the thicker and ſtronger from having a pretty good wad cloſely rammed over them.

FRIENDLY.

I am pleaſed with theſe experiments, as they have given me a better idea of the manner of barrels carrying ſhot than I could have imagined. I ſhould now be obliged for your opinion, whether Spaniſh barrels are really better than Engliſh ones of the ſame weight, as I find they are ſo eſteemed by many gentlemen.

AIMWELL.

The repute of the Spaniſh barrels aroſe chiefly from their lengths, being in general about three feet eight or ten inches long, of a ſmalliſh bore, and that nearly a cylinder; by which means the force of the powder is continued longer upon the ſhot; and I have already ſhewn you, that length of barrel will do more than weight. I have tried a good many Spaniſh barrels very carefully, and could never find them to carry the ſhot better than thoſe made in England of the ſame form and ſize. (But the foreigners have found out our foible in that, as in moſt other of their rarities; that is, if they are but far fetched and dear bought, they are ſure to pleaſe.) The Engliſh form of making them very ſtout at the breech, is in order to balance them better in hand, and make them come eaſier to fight. It anſwers in that reſpect, but then it makes them much heavier upon the whole, and a ſportſman will not chooſe to carry more weight than is neceſſary. I have already ſhewn you, that from the preſent method of ſhooting flying, we have no occaſion for guns to kill ſo far; and therefore ſhorter and lighter guns will better anſwer our purpoſe, as they are readier to come to fight, and will kill far enough.

FRIENDLY.

FRIENDLY.

I see you have a great variety of guns of different lengths of the Spanish form, which, with what you have said, makes me think you rather give the preference to the Spanish form.

AIMWELL.

Indeed I do, for several reasons. First, I never saw a gun of the Spanish form burst near the breech, though many of them are very small or weak; therefore it is not necessary to add such a quantity of metal on account of strength; it can only be with a design to balance it the lighter forward; but as barrels of common lengths will balance very well, it answers no good or useful purpose to make barrels so stout at the breech. Again, they often draw those barrels thinner forward about the middle, in order to make them the more handy, and to look neater, tho' I think it no addition to its beauty, and this will take off from the force the shot is carried out with; so that a barrel of the Spanish fashion, continued with a more regular thickness, will kill farther than one of a greater weight, where there is more metal than necessary at the breech and too thin forwards. Another disadvantage in a barrel so made is, that it will be bigger and clumsier about the lock part, and the stock will not have strength enough; for if you take notice, you will find the stock split with a little use from the breech to the foreside nail, oftener in these than in those of the Spanish fashion, where there is room to leave the stock stronger, without making it clumsy. But I would not have you imagine that I approve of barrels too thin at the breech. I would have them of proper substance for strength in every part, and so as to balance properly. I have experimentally seen a good killing barrel lose much of its force

in

in carrying ſhot, by filing it thinner; which ſhews that barrels ought not to be drawn ſo thin, ſince a tolerable ſubſtance is neceſſary both to carry the ſhot ſmartly, and for ſafety.

FRIENDLY.

Since you are ſo ready and free to inform me, if I am not too inquiſitive, pray explain to me why the bore you mentioned, of about five eighths of an inch diameter, is the beſt ſize for ſhooting flying, ſince the generality of barrels appear to me to be much larger?

AIMWELL.

It is very true that birding guns in general are of a larger bore: but if you judge of them by the ſize at the muzzle, they appear to be much larger than they really are, many of them being much opened at the muzzle, and gradually leſs for about a foot, and then continue nearly a cylinder to the breech. This form is uſed to make them carry the ſhot cloſer by letting them open gradually in coming out. The reaſon ſeems plauſible, and ſometimes appears to have ſome effect, when opened gradually a ſmall matter; but there is no reaſon to open them too much, for in that caſe the fire will have room to paſs off on each ſide all round the wad, when it comes to the part much wider, and then loſe of its force, and may alſo mix with the outermoſt part of the ſhot, and cauſe them to ſcatter more from a true direction. Many barrels are again opened a little wider gradually towards the breech, in order to carry ſhot with greater force, by firſt meeting with ſome reſiſtance, and then paſſing free, and alſo that the whole quantity of powder may take fire quicker. This has alſo appeared to me to anſwer the deſired effect; and yet I have met with barrels that have been as nearly a cylinder as poſſible

in

in the bore, yet have carried the ſhot as round and as ſtrong as any other. For which reaſon, I practiſe opening them but very little, and gradually, at each end, as I ſee occaſion; which method, I think, anſwers beſt. As to the ſize, it is certain there muſt be a fixed bore, which carries a particular load better than any other. Now, as ſhooting flying is very difficult for ſome to attain, and even the beſt markſmen have oftentimes their miſcarriages, they are are willing to make uſe of as large a load as they can, without hurting themſelves, and therefore ſome will make uſe of a large bore, thinking it will carry a larger load. 'Tis very true it will require a larger load; but then the gun muſt be heavier in proportion to the load, or, as I have already obſerved, they will be hit harder and the bird not ſo hard. If two ounces of ſhot and the ſame meaſure of powder be thought ſufficient, (and I think it is ſo for any ſort of game) then a barrel, whoſe bore is about five-eighths of an inch (or rather a little more) diameter, will be loaded about two diameters and a half of each, and the weight of the gun may be about ſix pounds. But thoſe who will ſhoot with two ounces and a quarter of ſhot and the ſame meaſure of powder, muſt carry a gun of about ſeven pounds, which will ſeem heavy to moſt people, after three or four hours walk. Indeed, I have known two ounces and a half, and three ounces of ſhot made uſe of to a gun under that weight; but then a ſmaller quantity of powder was uſed, and conſequently could not be ſo efficacious as a ſmaller quantity of ſhot and equal meaſure of powder; and if a ſmaller bored barrel is loaded too deep, tho' the gun be heavy enough, the ſhot would not be thrown cloſer than they

would be with a proper load, that is about two diameters and a half of each; and if a larger bore have not its proper load, it will not kill so smartly as the same load in a bore proper for the load. There are but few who will care to stand before a proper load for a barrel six-eighths of an inch diameter, except poachers, who are covetous of killing every thing, and will stand the bruising for a small advantage; but fair sportsmen are not such spit-hunters; they pursue for the sake of diversion, and to shew their dexterity.

FRIENDLY.

I am greatly obliged for this account of barrels, which is fuller and more satisfactory than I expected. And now, Sir, I think I may venture to choose a gun. There seems to be one of the size and bore you recommended.

AIMWELL.

'Tis very true, Sir; but you are not yet judge enough to choose a gun. There is more to be observed than the size and the bore of the barrel. That gun is made for a broad shouldered man; the stock is bent sideways, as if you would lay the plate of the lock upon your knee, and with your hands could bend it; and the point or toe of the butt turns out a little to the right, so as to bring the breech of the barrel to his eye in a direct line with the muzzle, without constraint or bending his head much, which a short necked man cannot do without danger of hurting his face. If you please, give me leave to recommend this gun to you. The stock of it is of a middling bend and length, and quite straight sideways; which, as you are slender, and your neck somewhat long, will best suit you. The length of the butt from the breech is about 15 inches and half, and if a straight spline is laid to the barrel, so as to touch the muzzle

muzzle and breech, continued to the butt, you will find that the butt drops about three inches from the line, (and for a man who has a ſhort neck it ought to drop a quarter of an inch more) and at about three inches from the butt, where the face touches, about two inches and a half; and if he is broad and ſtout, and his arms cannot reach ſo forward, fourteen inches or fourteen and a half in length from breech to butt may be ſufficient. Pleaſe to take hold of the gun, and balance it upon the fore finger of your left hand, (which is a proper ſituation for your left hand) then join your right hand with your fore finger, juſt to feel the trigger, your thumb upon the cock, and throwing it off a little ſpace from you in a horizontal direction, to prevent its rubbing againſt your ſhoulder. In taking up the gun ſlip your thumb off the cock, and draw the butt to your ſhoulder, ſo as to feel it gently, and point the muzzle to any object; and if you find the breech in a line with the muzzle, without any conſtraint, it then lies very well to ſuit you. Now, if you obſerve, you will find an error, which many gunſmiths perſiſt in, is here remedied: the trigger is hung at a right angle with the pull of your finger, and as backward as the guard will admit of; whereas the trigger is frequently hung to form a right angle with that part of the ſtock where it hangs, in which caſe the finger draws at a diſadvantage, being in drawing it forced cloſe to the ſtock; which poſition ſhortens the lever, and cauſes it to draw off harder than in this, where you find the finger more naturally ſlips to the end of the trigger, and lengthens the lever; and it is neceſſary to take the advantage of this as much as may be, in order to have a good ſear-ſpring, without which the lock cannot move well nor

ſafely; for if the ſear-ſpring be made too weak, in order to make it draw off eaſy, it will then be ſubject to catch upon the half cock, and if it draws off too hard, you cannot be certain of ſhooting any flying object. Another diſadvantage that attends the trigger being hung too forward is, that the middle finger will be ſo near the guard as to receive a blow upon the diſcharge of the piece: I have ſeen many perſons who had a callous ſwelling upon this finger from being battered by the guard through this defect. I think it neceſſary to give you this hint, as you may ſometimes have occaſion to ſhoot with other guns, or to make choice of a gun elſewhere.

FRIENDLY.

I believe I ſhall fix on this gun, as it ſeems very handy to me, and comes eaſy to ſight. But pray be ſo kind as to inform me, if you have any objection to a barrel of two feet ſix inches, more than its carrying the ſhot; for the gun we tried of that length ſeemed to carry the ſhot very ſmartly and cloſe at 30 yards.

AIMWELL.

Your obſervation, Sir, is true; it threw in ninety ſhot, on a medium, at thirty yards, into a ſheet of paper; which one may venture to affirm would kill a bird if held right, and it may ſometimes kill at forty yards. But pleaſe to take notice, that the weight of it was ſix pounds two ounces; and if you compare the ſhoots with thoſe made with the three feet gun, whoſe weight was but five pounds thirteen ounces, you will find them ſo much ſuperior, that it muſt evidently kill farther with the ſame load; which, I think, is one objection to your propoſal. The next is, ſhould a ſhort gun go off by an accident whilſt you are loading it, you are more expoſed to danger,

as

as you will more naturally lean over the muzzle; which, however, in ſhort or long guns ought always to be avoided. What has once happened may happen again: A gentleman, whom I knew very well, was out by himſelf a ſhooting, and juſt as he had loaded his gun (though he knew of no defect in the lock 'till it was afterwards examined) it went off, and ſcalped him ſo as to leave the forehead bare to the ſcull. We may ſuppoſe he laid ſome time ſenſeleſs. As ſoon as he recovered a little, he ſaw his hat ſhot to pieces and himſelf bloody; perceiving what had happened, he tied a handkerchief about his head and walked home, and is now perfectly recovered.

FRIENDLY.

A narrow eſcape with life, indeed! and I am greatly obliged for this caution. Indeed the frequent misfortunes which happen from guns ſhew we cannot be too careful in the uſe of them; and I muſt agree with you, that we are not ſo much expoſed to ſuch an accident as this from a long gun, as from a ſhort one.

AIMWELL.

There is one more objection, which I think an over-balance to the advantage, if it be thought one, of a ſhort gun's coming more readily to ſight; which is, though a longer gun requires a little more care to bring it to the object, when it is once brought it is not ſo eaſily put aſide as a ſhort one, nor does a little variation of the muzzle carry the ſhot ſo wide from the object as the ſame variation of a ſhort one does; which I think may be eaſily explained. Draw a line upon a ſheet of paper, and from a point, with a pair of compaſſes, cut the line at two inches and a half, and three inches and a half; from the ſame points of interſection ſet off one tenth of an inch from the line, and

and draw lines from the first point through each of these: then at about twelve inches from the three and a half, you will find it will vary half an inch from the first line, and the other, which intersects at a tenth distance from the line at the two inches and a half, will at the twelve inches be found to vary about three quarters of an inch. Now, if you count a foot for an inch, the one will have varied six inches, and the other about nine inches, at the distance only of twelve feet; which I think plainly shews that a small variation of a short barrel will cause a greater error, which will encrease as the distance of the bird is farther from you. But if your barrel be too long, and not ready to come to sight, then your extraordinary lengths will not answer your expectations, as you may judge from the experiments we have made, that good barrels will not kill above a yard for an inch in length of barrel, from three feet to four feet in length; and therefore a barrel of three feet three inches, I think, answers the best.

FRIENDLY.

Well, Sir, you have sufficiently satisfied me in all the questions I am at present able to ask, as to the choice of guns, and I would not have been without this knowledge upon any account, as I am certain it will enable me to go on with ease and courage, and I shall sooner become a proficient in the art of shooting flying. But pray what is next to be done?

AIMWELL.

I shall now give you a short lesson, which will take you a long time to get; but I must first take the flint out of your gun, and put in a piece of wood of the same form, that you may not wear the steel of the hammer by frequently striking it down. And now, Sir, take the piece, carry it upon

upon your left arm with the thumb of your right hand upon the cock, and fixing your eye upon any particular object, present the gun in the manner before directed, and in the motion of bringing it up cock it; do it briskly, but in no hurry so as to confuse yourself. In raising the cock take care that you present the muzzle as near as you can at once to the object, only rather below, that you may have a little matter to raise it, and as quick as you can; briskly draw the trigger as soon as you have got an exact sight at the object, and continue to keep your muzzle at it for some time after you have drawn the trigger, lest your gun should hang fire; which if it happens to do in a very small degree, it will render your shot quite uncertain, especially if your mark be moving towards right or left, or any way from the line; but by means of your keeping the gun in motion with the object, a shot may be sometimes recovered though it hangs fire. This you may practise in your room, or when you walk, at any object steady or flying; and do it as often as you can conveniently, till you can readily get the object and draw down in proper time; by which means you will make a greater progress in one month than by the common method of shooting in a year or two.

It may not be amiss now just to give you a hint concerning cross-shooting. From the many experiments you have seen of guns carrying shot, you must have an idea how shot spread at different distances.

A very good gun at twenty yards will spread the shot so, that in a circle of twelve or fourteen inches no bird can escape alive. Now, if the situation oblige you to shoot at a bird at this distance flying cross, either to right or left, if you take aim six inches before it, supposing the bird not to have

have moved from the time of your drawing the trigger to the ſhot's hitting it, the bird will be entered far enough into the circle of the ſhot to be ſecured; but as the bird is in motion it muſt have moved ſome way before the ſhot can reach it, ſo that it is moſt likely the bird will meet the center ſhot, and ſhould you be ſomething longer in drawing the trigger, you will have the better chance for the rear ſhot. From the ſame reaſoning if you take exact aim at a bird and draw briſkly, you may kill it with the rear ſhot; but by obſerving the above method, you have double chance, as the bird muſt paſs through the whole diſk of the ſhot. I think I have already remarked, from the experiments we have made, that the ſhot delivered from a gun in general loſe or decreaſe half the quantity every ten yards, or thereabouts, ſo that at forty yards there will not be thrown in above a fourth of what would be into the ſame ſpace at twenty yards; from which it appears, that if you take aim a foot before a croſs ſhoot at forty yards, you will be the moſt likely to meet the bird with the center ſhot; and which, by the way, I look upon to fly the ſtrongeſt, and to be the more efficacious at long diſtances than the diverging ſhot; for whether it be the ſhot ſtriking againſt each other, or againſt the air, at firſt coming out of the muzzle, or whatever be the cauſe of their diverging, I think it muſt in ſome degree retard their motion. But if there be a briſk wind it will certainly bend the courſe of the ſhot; you muſt therefore conſider whether the wind blow with the bird or againſt it; if it blow with it, you need little more than to obſerve the general rule, becauſe the wind helps the bird forward nearly as much as it diverts the ſhot; but if it fly againſt the wind, the ſhot decline more than the bird is re-

retarded, and therefore you ought to take aim at a greater diſtance before the bird.

Theſe hints may be of ſervice, and from theſe you may judge of all other diſtances. Yet practice only can make you a maſter in this critical point, as alſo in the oblique ſhoots. For inſtance, ſuppoſe a bird at any diſtance from you flies off in a diagonal line, you muſt take aim but half as much before it as you would do in a croſs ſhoot at the ſame diſtance; and in the ſame proportion at a greater or leſs angle. The different marks were very prettily deſcribed by an ingenious gentleman of St. John's college, ſome years ago, in a poem called PTERYPHLEGIA, which is ſo fit for the occaſion, that I ſhall give it you in his own words:

" Five general ſorts of flying marks there are,
" The lineals two, traverſe and circular,
" The fifth oblique—which I may vainly teach,
" But practice only perfectly can reach.
" When a bird comes directly in your face,
" Contain your fire awhile, and let her paſs,
" Unleſs ſome trees behind you change the caſe.
" If ſo, a little ſpace above her head
" Advance the muzzle, and you ſtrike her dead.
" Ever let ſhot purſue where there is room;
" Marks hard before, thus eaſy will become.
" But when a bird flies from you in a line,
" With little care I may pronounce her thine.
" The unlucky croſs-mark or the traverſe ſhoot,
" By ſome thought eaſy, yet admits diſpute.
" As the moſt common practice is to fire
" Before the bird, will niceſt time require;
" For too much ſpace allow'd the ſhot will fly
" All innocent, and paſs too nimbly by:

" Too little ſpace, the partridge, ſwift as wind,
" Will dart athwart, and bilk her death behind.
" This makes the point ſo difficult to gueſs,
" 'Cauſe you muſt be exact in time, or miſs:
" Full forty yards, or more, to left or right,
" The partridge then obliquely takes her flight:
" You've there th' advantage of a ſideling line,
" Be careful, nor her inward ſide decline.
" Thus in the mark is ſtiled circular,
" There's nothing more requir'd but ſteady care
" T' attend the motion of the bird, and gain
" The beſt and fartheſt lineal point you can;
" Carrying your piece around, have patience till
" The mark's at beſt extent, then fire and kill."

DIALOGUE III.

FRIENDLY.

WELL, Sir, for this week ſince I ſaw you, I have much practiſed the leſſon you gave me, and believe it will be of great uſe to me; for I find I can already point the gun to any object very readily.

AIMWELL.

Sir, I don't doubt your application, and ſhall now put a flint into your gun, and recommend it to you to practiſe ſome time the ſame method with a little prime, and then with a ſmall load of powder; which may not improperly be termed teaching you to ſtand fire, without the leaſt ſtarting, which is a thing very material towards the becoming a good markſman. When you are perfect in this, you may ſhoot at a mark at twenty yards, with half a charge or a little more. By degrees,

degrees, as you find you can do it well, without any fear or uneaſineſs, repeat the ſame at thirty yards, with about three quarters of a charge.

FRIENDLY.

I am obliged for this leſſon. I ſhall call on you again in about a week; in which time I don't doubt but I ſhall be able to handle the gun very dexterouſly.

AIMWELL.

I believe you will ſoon make a progreſs in ſhooting; but I have juſt thought of a method, which I ſhall now inform you of, by the practice of which you may be able to become a tolerable markſman at your firſt going into the field. Get a target made of a piece of board; let it be round, and about three feet diameter; put a ſtaple into the edge of it to hang it up by; get a ſpline ten or 12 feet long, and to one end of it fix a hook to hang the target on, and near the other end make ſeveral holes to hang it to an iron pin, which is to be fixed up in a convenient place at a proper height, ſo as the target when hung on it be ſuſpended ſometimes a little higher, and ſometimes lower than a point blank mark. This is to be put in motion like a pendulum, and you may ſhoot at it whilſt it is moving, either to the right or left, with about half a load, at twenty yards diſtance; and by the breadth of the target you will eaſily ſee how the body of the ſhot went, either before or behind the mark, and the next ſhot you may take aim accordingly. It will be neceſſary that you prepare ſome whitening that you may with a bruſh cover your ſhots every time before you ſhoot again: and a piece of charcoal, you may may make a mark to take aim at. You may alſo ſometimes ſtand obliquely to it, by which means you may make a very great variety of marks. When you have

made this way of ſhooting very familiar to you, try it with about three quarters of a load at thirty yards: and by much practice of this method, you may become a better markſman at firſt going into the field than you would be without it by a year's practice in the field; becauſe you may hereby diſcover an error, that you perhaps would perſiſt in; and you can repeat your ſhoots at any time when you have leiſure, as often as you like; which is not the caſe in the field; for ſport is ſo very uncertain, that you may go out ſeveral times and not get many ſhoots; ſo that, unleſs a man be very alert, and ſtrong enough to undergo a deal of fatigue, he can attain the art of ſhooting flying but very ſlowly: whereas by this contrivance it becomes a ſcience, and may be practiſed with ſatisfaction by the curious either weak or ſtrong. The reaſon why you are to uſe but half a load at firſt, is, that it may not in the leaſt diſturb your poſition, or cauſe you to ſtart; which if you ſhould get a habit of at firſt (as you may do by overloading) you will find it difficult to attain to any certainty: for you muſt be very ſteady and endeavour to keep the gun to the mark after you have drawn the trigger, as has before been obſerved, and the ſhot will fly thick enough at twenty yards to make your obſervations from; and you may increaſe your load and the diſtance you ſhoot at, by degrees, as you find it convenient: but never be covetous of overloading, though you want to kill at long diſtances, for that will not anſwer your expectation.

Since I wrote the above, another method hath occurred to me for improvement in the art of ſhooting flying. I think it may prove a pleaſing as well as uſeful diverſion, being more analogous to this art than ſhooting at a moving pendulum, as more

more time may be taken and have the object move faſter or ſlower as you like.

Strain a line (about the ſize of a common bed-cord) from two ſtrong hooks drove into a wall, or two poſts, at eight or ten yards diſtance as your conveniency will permit. Another line muſt be ſtrained under the former, about a foot lower. A board muſt be prepared the ſize of a large ſheet of paper; having a thick ſplint with a groove nailed on its back at the upper edge, which groove muſt be ſo large and deep, that when hung on your upper line, it may ſlide freely thereon without being being thrown off, and it will move ſteadily by ſliding againſt the lower line.

Two ſmall tenter hooks may be put into the upper corners, and two ſtraight pins into the lower corners of the board, for the greater eaſe of putting on and taking off a ſheet of paper, which is to be changed every ſhot.

By a ſmall line faſtened at each end of the board, it may be drawn from one end of your fixed lines to the other, either to right or left with as much ſwiftneſs as a perſon can run.

If there is not room enough where the trials are made to run ſtraight out, a pulley, or roller, may be fixed at each end of the ſtrained lines, and the ſmall line being put over the roller or pulley, the board or target may be drawn along by the perſon moving towards you in an angle with the fixed lines. The board being at one end of the lines, give the word for its moving, and as ſoon as you ſee it move, cock your gun and preſent it at the mark and keep it in motion therewith; and as ſoon as you ſee the muzzle juſt before it, briſkly draw the trigger, but continue in the ſame motion for ſome time after, leſt the gun ſhould hang fire, or not fire ſo quick as it ought to do, and this motion

ſhould

ſhould be performed by ſteadily moving the whole body.

Variety of croſs or oblique ſhoots may thus be made either to the right or left, and you may ſometimes raiſe one end of the ſtrained lines higher than the other, by which a greater variety may be made. Half a common charge of powder and ſhot (and the ſmaller the ſhot the better) will be ſufficient at ſuch ſhort diſtances, as it may be thrown into a circle of ten or twelve inches diameter.

By this method you will be able to judge of your error, and how to amend it in your next ſhoot, which cannot be ſo eaſily diſcovered when you miſs a bird; a perſon may therefore make greater progreſs by the practice of this method in a week, than in a whole ſeaſon ſhooting at birds, with this advantage, that he may uſe it when it beſt ſuits his leiſure. It will alſo remedy the inconveniency a young ſportſman labours under, where game is not plentiful, as he may walk ſome hours for a ſhoot or two, which renders him ſo eager and unſteady, as not to take proper time when he happens of one, and ſo miſſes his aim.

I am alſo of opinion it may prove an agreeable diverſion to many who have not leiſure either to take the field or bear the fatigue which neceſſarily attends the purſuit of game; and would certainly be as harmleſs and more manly than many of our modern diverſions or exerciſes.

It may not be improper in this place to take notice of the force of powder. As there is an amazing difference in the ſtrength of powder, it is neceſſary that you try your powder, and increaſe or decreaſe its quantity, in proportion to its weakneſs or ſtrength. There are ſmall machines for this purpoſe, with a lock ſomething like a piſtol, which are convenient, as they are portable:

portable: but I lately contrived one, which seems to be much more satisfactory. I shall endeavour to describe it to you as follows: It was made of forged iron, one inch and three quarters square and two inches and a half long, with a shank about two inches long, on which part was filed a coarse screw, to fix it into a block by. A round ball was made of forged iron, about one inch and seven tenths diameter, and weighed 12 ounces. At the top of the iron was a hollow, made to receive about a third part of the ball, and fitting it very close. In the middle of this hollow a hole was drill'd, about three tenths of an inch diameter, and one inch and a quarter deep, which held eighteen grains weight of powder; a place was sank on one of the edges of the square for a pan, and a touch-hole drill'd. Thus compleated it was screwed into a block, to point a little higher than an angle of forty-five degrees, that the ball might lay the steadier in the hollow. After this I made the following experiments:

	Yards.
Some Dutch powder, large grained, threw the ball	1 1-half
Some powder bought at the grocer's at 16d. per pound, near	4
Battle powder	8 1-half
Double strong ditto	8 1-half
Best double strong ditto	12

The experiments were tried first with the strong powder, which increased at the second trial about a yard and a half, and third trial near a yard more. After which, the iron being a little warmed, the trials with the same powder came pretty nearly alike, and each sort was tried three or four times; the ball was also carried very nearly in the same line; from which circumstance I conclude this the

the beſt method of proving gunpowder that I have yet met with.

If you have a deſire to be acquainted with the nature and compoſition of gunpowder, and the good and bad qualities attending it, I recommend to your peruſal the tracts on New Principles of Gunnery, by the late ingenious Benjamin Robins, Eſq; wherein, by a new contrivance, he has not only determined the force of any quantity of gunpowder, but alſo the velocities of balls diſcharged from barrels of ſeveral lengths, in a moſt accurate manner. He alſo makes it appear, that the incurvated track of balls to the right or left, or otherwiſe from the line, is occaſioned partly from the reſiſtance of the air on the inequalities of the ſurface, and partly from a whirling motion the bullet has acquired coming out of the barrel. I think it is not unlikely, that the great difference of our ſhoots made with the ſame quantities of ſhot from the ſame piece, may be from the ſame cauſes, as ſome of the ſhot are not very round, and ſome of them may acquire a greater degree of that whirling motion than others in parting from each other, which will continually increaſe the deflection as they go on from the line. If this be the caſe, we ſhould not endeavour to throw them with more force than is neceſſary, becauſe he proves, that the reſiſtance of the air will increaſe in a much greater proportion to the force added than has hitherto been ſuſpected, and will conſequently increaſe the deflection of thoſe ſhot which have received ſuch a motion. Upon the whole, therefore, I think, if you uſe the beſt double ſtrong powder, two-thirds of the quantity will have as much force as the full charges of common powder, and be ſufficient to kill at fifty yards, which is as great a diſtance as a ſportſman will

will in general attempt to ſhoot at, and indeed greater than he ought to ſhoot at; for if we will make the lives of the poor birds our diverſion, we ought to put them to as little miſery as we can, and therefore ſhould not ſhoot without being certain they are within our reach, ſo that the ſhot may fly thick enough to kill them outright. I therefore recommend it to you to begin with that quantity of the beſt powder, and not increaſe it, unleſs you find it neceſſary.

I have now given you all the hints I can recollect ſerviceable for the improvement of a young practitioner; but it muſt be from much exerciſe that you will become a markſman. As to your conduct in the field, you will have opportunities of going out with different perſons, who will differ much in their opinions: I ſhall therefore leave it to your own judgment to deal on every occaſion as experience may direct.

As you are going to leave this part of the country to-morrow, and the ſhooting ſeaſon is juſt at hand, I ſhall diſmiſs you with the following hints, always neceſſary to be remembered.

Take care to keep your powder from getting damp, which will weaken it in proportion to the quantity of moiſture it receives.

Before you take the field, oil the ſprings of the lock, examine that your barrel be clean and dry, and clear the touch-hole with a feather, which you may leave remaining in it until you load.

Take with you flints, a turn-ſcrew, and a worm upon your rammer.

Load not till you are near the place of action.

It will not be amiſs to fire off a little powder firſt, to warm the barrel; if you do not, it is neceſſary to put in a little more powder for the firſt load.

Prime not too full.

Ram down your powder very gently, with a ſingle wad of ſoft paper over it, and pretty tight, with a double wad over the ſhot.

When you have fired, load again as briſk as poſſible, before the barrel cools, as the heat will expel any dampneſs from the powder, and increaſe its force.

Be careful, yet not timorous.

Raiſe your piece gently to the object.

Take time, and never ſhoot without aim.

Be ſilent, and avoid the ſun.

APPENDIX.

APPENDIX.

HAVING in my first edition of the Art of Shooting Flying recommended to the curious the perusal of the Tracts on New Principles of Gunnery, by the late ingenious Benjamin Robins, Esq; it has been requested, that in my next edition I would select from that work such parts as may be thought useful to sportsmen, in discovering the real velocities with which shot are thrown from barrels of different lengths and bores, with various charges of powder and shot. I shall, therefore, first give a short account of the nature and properties of gunpowder; then proceed to give the rules for finding the potential or greatest range of bullets, at forty-five degrees of elevation; of pieces of various lengths and bores, estimated in vacuo; from which will be shewn how much the velocity will be increased or decreased, by lengthening or shortening the barrels; and then to elucidate the whole from experiments, as nearly as the nature of such computations will admit, for a rigorous and geometrical determination is incompatible with the subject, it being almost impossible to make two experiments alike, without some variation, though near enough for our purpose to distinguish the goodness of guns used by

ſportſmen, amongſt whom are ſuch frequent diſputes. And firſt of gunpowder.

Gunpowder is a compoſition of ſalt-petre, ſulphur, and charcoal. The ingredients are firſt to be finely powdered, then moiſtened with fair water, vinegar, ſpirit of wine or urine; and afterwards all muſt be well beaten for a long time, taking care to wet the maſs frequently to prevent its taking fire; and laſtly, ſqueezing it through a ſieve to granulate it.

The charcoal and ſulphur eaſily take fire and kindle the nitre; and the ſpirit of nitre being thereby rarefied into vapour, ruſhes out with an exploſion.

'The proportions of the ingredients of gunpowder are various; but that which has been approved by experiments, and ſeems now to be generally allowed the beſt, is, that in any quantity of powder three-fourths of it ſhould be ſaltpetre, and the remaining one-fourth conſiſting of equal quantities of ſulphur and charcoal. The moſt expenſive part of the compoſition, and conſequently the part in which powder is moſt liable to defect, is the ſaltpetre.'

'Salt-petre is of itſelf an uninflammable ſubſtance, for if it be put in the moſt violent fire, it only melts, and never flames, provided no combuſtible matter be blended with it. But tho' unmixed with other bodies it will neither flame nor burn, yet if it be joined with combuſtible ſubſtances, it greatly augments the violence of their burning: powder then being a mixture of ſulphur and charcoal (which are inflammable ſubſtances) with ſalt-petre (which in itſelf is not) if the ſalt-petre be too much in quantity, when compared with the other two, their burning may not be ſufficient to conſume

the

‘ the whole of the salt-petre, whence the fire may
‘ be less violent. On the other hand, if the salt-
‘ petre be less than what the burning of the
‘ other two substances can easily consume, the fire
‘ will be less active and explosive than it ought
‘ to be.

‘ Hence it appears, that the goodness of pow-
‘ der is not to be estimated from the quantity of
‘ salt-petre only contained therein; altho' that
‘ substance seems to be the basis of the elastic
‘ fluid in which its force consists. Nor is it the
‘ due proportion of the materials only which is
‘ necessary to the making of good powder; an-
‘ other circumstance not less essential is the mix-
‘ ing of them well together. If this be not
‘ effectually done, some parts of the composition
‘ will have too little force; and in either case
‘ there will be a diminution in the strength of the
‘ powder.

‘ Gunpowder fired exhibits, by its explosion,
‘ the effects of an elastic fluid; whether it be air
‘ or not I shall not take upon me here to deter-
‘ mine; but this is certain, it acts like air in a
‘ condensed state. This fluid seems to be de-
‘ rived from the salt-petre alone; for neither
‘ the brimstone nor charcoal yield it when fired
‘ separately, and salt-petre is known to be a sub-
‘ stance imbibed from the air by the earth; for
‘ the same parcel of earth, by being properly
‘ exposed to the air, will furnish salt-petre over
‘ and over again for ever.

‘ Now as bad powder usually contains some
‘ common salt in it, by reason of the little care
‘ taken in refining the nitre; and as common
‘ salt imbibes moisture in a stronger degree than
‘ nitre; it is not difficult to conceive how bad
‘ powder should in a moist season be more im-
‘ pregnated

'pregnated with moisture than good, and conse-
'quently lose more of its force.

'As powder when wet will not fire at all, so
'every degree of moisture will lessen its force. If,
'therefore, powder be exposed to the greatest
'damps without any caution, or if common salt
'abounds in it, the moisture it imbibes may per-
'haps be sufficient to dissolve some parts of the
'nitre, which is a lasting damage that no dryness
'can retrieve; but if proper care be taken, in pre-
'serving the powder, and the nitre it is composed
'of has been well purged of the common salt,
'it will retain its force many years.

'But the moisture of the atmosphere will in-
'crease the weight of powder even in a room
'where a fire is kept; it is therefore necessary to
'dry the powder in damp weather before you use
'it. But some care is required in drying damp
'powder: for there is a degree of heat, which
'though not sufficient to fire the powder, will
'yet melt the sulphur, and destroy the texture of
'the grains: nay more, there is a heat with which
'the sulphur will flame and burn away gradual-
'ly, and yet the powder will not explode. Of
'this any one may satisfy himself by heating a
'plate of iron red hot, and then throwing on a
'few grains of powder at intervals during the time
'of its cooling; for by this means he will find,
'that at a certain time the separate grains that
'fall on the iron will not explode, but will
'burn with a small blue flame for some space
'of time, the grains still remaining uncon-
'sumed.

'Standard gunpowder, such as is or ought to
'be made for the use of the government, fired in
'any space, acts nearly in the same manner as a
'quantity of air would do, which was a thousand

'times

'times more denſe than the common air we 'breathe; and which in that condenſed ſtate fill-'ed the ſame ſpace that was taken up with the 'unfired powder.'

Hence it follows, that the preſſure of the powder on the ſhot grows perpetually weaker and weaker, as the ſhot are impelled forwards; the inflamed powder taking up more room, and conſequently its elaſticity being diminiſhed.

Mr. Robins diſcovered, 'in a piece near four 'feet in length, charged with half an ounce of 'powder, and the ball about an ounce, that the 'velocity communicated to the bullet during the 'three firſt inches of its motion, was full half the 'velocity which it acquired in its whole paſſage 'through the barrel; and that the elaſticity or 'force of the powder in the firſt three inches of 'its expanſion, was at a medium near eight times 'greater than in the laſt two feet of the barrel; 'that from theſe circumſtances, the whole maſs 'of powder might be ſuppoſed to be kindled be-'fore the bullet was ſenſibly moved from its 'place.

'That if the charge of powder in a twenty-four 'pounder take up one foot of the cylinder before 'it is fired, and the whole length of the cylinder 'be nine feet, then when the bullet arrives at the 'mouth of the piece, the powder extends through 'nine times the ſpace it did at firſt, and conſe-'quently exerts but one ninth of its original preſ-'ſure; and the longer the piece be, in proportion 'to the extent of the charge, the more is the ac-'tion of the powder diminiſhed.

'If the ſame piece be fired ſucceſſively with dif-'ferent charges of powder; the preſſure of theſe 'different charges upon the bullet, in any given

'part

'part of the barrel, is nearly in proportion to the 'quantity in each charge.

'If two pieces of the same bore, but of different 'lengths, be charged with the same quantity of 'powder; the longer the piece, it will, strictly 'speaking, communicate the greater velocity to 'the bullet. However unless their lengths be 'extremely disproportioned, the velocities of their 'respective bullets will differ but little: for in-'stance: if a musket-barrel, of a common length 'and bore, be fired with a leaden bullet, and 'half its weight in powder, and if the same bar-'rel be afterwards shortened by one half, and be 'again fired with the same charge; the velocity 'of the bullet in this shortened barrel will be a-'bout one sixth part less than what it was when 'the barrel was entire: and if, instead of shorten-'ing the barrel, it be increased to twice its cus-'tomary length, (when it will be near eight feet 'long) the velocity of the bullet will be thereby 'augmented by no more than one eighth part; 'and the greater the length of the piece be, in 'proportion to the diameter of the bullet, and the 'smaller the quantity of powder, the more incon-'siderable will these alterations of velocity prove. 'So that increasing or diminishing a twenty-four 'pounder, for instance, by a foot in length, with 'its customary charge of powder, occasions no 'greater change than one fortieth part in its ve-'locity.'

From the above-mentioned principles, the actual velocities, with which bullets are impelled from their respective pieces, are easily assigned; whence the potential random, or their greatest ranges at 45 degrees estimated in vacuo, may be readily known. I shall here lay down some practical

tical rules for that end, without entering into their demonstration.

RULE.

'If a leaden bullet be fired with its weight of 'powder from a piece of 90 diameters long, its 'potential random will be 60,000 yards; and if 'both the powder and the length of the piece be 'together increased or diminished in any propor- 'tion, the potential random will be increased or 'diminished in the same proportion. Thus with 'half of the weight of the bullet in powder, and 'a piece of 45 diameters long, the potential ran- 'dom will be 30,000 yards; and with a fourth 'of the weight of powder, and a piece of 22 one- 'half diameters, its potential random will be '15,000 yards.

'To find the potential random to any given 'piece, bullet and charge, proceed thus: First 'find what length of piece, (estimated in dia- 'meters of the bullet) and what potential random 'corresponds in the preceding rule to the given 'charge of powder: call this potential random 'A; then if the length assigned by the rule be 'the same with the length of the given piece, this 'number A is obviously the potential random 'sought. But if the length of the given piece 'be more than the length deduced from the rule, 'then take the difference of the tabular loga- 'rithms of these two lengths, and multiplying 'this difference into A (the logarithm of 10 'being supposed unity) and then adding the re- 'sulting product to A, the sum will be the poten- 'tial random required. If the given piece fall 'short of the length deduced from the rule, in- 'stead of exceeding it, then the product of the 'difference of the logarithms into A must be taken

'from A, and the remainder will be the potential random fought.'

Suppose it be required to determine the potential random of a piece thirty inches long and six tenths bore, carrying a bullet three quarters of an ounce weight*, equal to 328 grains, with 80 grains of powder; 80)328(4,1: here the weight of ball is four and one-tenth the weight of the powder; and by the rule, 90 by 4,1 is,

4,1)90,0(22 diameters,

And 4,1)60000,0(14634 yards, which call A; whence a piece of 22 diameters in length, with this charge, would have a random of about 14634 yards. The barrel in question being 30 inches is 50 diameters, substract the logarithm of 22 from the logarithm of 50.

The logarithm of 50 is	1,6989700
The logarithm of 22 is	1,3424227
	0,3565473
The difference multiplied by A	14634
	14261892
	10696419
	21392838
	14261892
	3565473
	5217,7131882
To which add	14634

The potential 19851 rand. fought

	Inches.	Diam.	Random.	
A piece of	36, is	60	21010	Yards.
Ditto of	42, is	70	21990	
Ditto of	48, is	80	22838	
Ditto of	60, is	100	24256	

Now

* 438 grains weight is equal to an ounce avoirdupoise.

Now let us suppose the killing distance of the piece of two feet six to be 40 yards; if we divide its random by 496, it will give that number 40; and if all the other randoms be divided by the same, their quotients will bear the same proportion.

		Diam.	Yards.
Thus the barrel	2 feet 6	50	40
	3 feet	60	42,3
	3 feet 6	70	44,3
	4 feet	80	46
	5 feet	100	48,9

And these are the proportions of their killing distances, or velocities, from pieces of these lengths with the same bore and load. And barrels of any different sized bores, with the same proportion of powder to the weight of the bullet, and the same lengths in diameters of the bullet, will have the same ranges.

Hence a piece of six-eighths bore will require a bullet of one-twelfth of a pound, equal to 584 grains; and 142 grains weight of powder, and 50 diameters, equal to 37 1-half inches, will be required to give the same range, or the same velocity, with the barrel of 30 inches in length, and six-tenths bore. So that a piece of six-eighths bore, with the load mentioned, and 30 inches long, will be only 40 diameters, and the random would be 18433 yards, and its proportional killing distance only 37 yards; but as this load of powder is greater than any man can bear to stand against, with double the weight of the bullet in shot, its velocity will be much decreased by lessening the quantity of powder; so that 90 grains weight of powder to the ball of 584 grains, with a piece of 40 diameters, would range only 13438

yards, its killing distance in proportion with the others being only 27 yards.

The following is the difference in the lengths of barrels of these two bores to give the same velocities, occasioned by the difference of the diameters; with the due proportions of powder and ball to each size.

Diameters.	6 10ths bore.		6 8ths.
50 of	2 feet 6	is	3 feet 1
60 —	3 0	—	3 9
70 —	3 6	—	4 4
80 —	4 0	—	5 0

Hence, pieces of any sized bores must have so many diameters in length, and the same proportion of powder to the size of the ball, to give the same velocities.

In the former edition I endeavoured to prove, by comparing shoots made at several distances, that a barrel of a common length will not increase or decrease above a yard in distance for one inch of barrel, in regard to its carrying of the shot closer, &c. and by the above calculations it will not make above two yards difference in the velocity for six inches of barrel; or (from the same) only nine yards for twice the length of barrel, from two feet and a half to five feet.

From the preceding rules, the potential random of pieces of any lengths or bores may be found; but this on a supposition, that all barrels of the same lengths and bores, with the same charge, will throw a bullet with equal velocity.

Mr. Robins asserts, that he has had several barrels made for that purpose of different metals and weights, yet of the same dimensions of length and bore, and found no sensible difference in their range. However this may be with bullets, it is well known by experienced sportsmen, that there are

great

great differences in the velocities of ſhot thrown from barrels of the ſame lengths and bores; I ſhall, therefore, next point out the methods by which their real velocities may be known, and refer to ſome experiments ſufficient to determine the ſame.

The firſt method I ſhall propoſe for this purpoſe, is that contrived by Mr. Robins, for determining the real velocities of bullets, by firing them at a pendulum. Such a pendulum I made, according to the following eaſy and cheap conſtruction.

To a piece of flat iron, about a foot long, having a pivot at each end, I rivetted the end of a flat iron rod, about 54 inches in length, ſo as to form a T. At the bottom of the rod were three holes, about three inches from each other; to which was faſtened, by three ſtrong wood ſcrews, a piece of plank wood about fourteen inches ſquare, and two inches and a half thick. I then hung it upon two half-ſtaples to a joiſt of the cieling of an out-houſe, oppoſite the door, ſo that it might be eaſily taken off and on as I wanted it, and ſwing to and from the door ſpace ſo freely on its pivots, as to be eaſily put in motion; the pivots being greas'd or oil'd, to prevent any extra-friction of the ſtaples cutting the pivots: I then fixed a ſmall iron rod from the lower part of the wood or pendulum, to reach within about four inches of the floor, with a loop-hole at its end, to faſten a ribbon or tape to. At a little diſtance before it, was laid looſe on the floor a piece of wood, heavy enough to reſiſt a ſmall force, to which was fixed a piece of ſimple contrivance, through which the tape might be drawn eaſy, but yet ſtiff enough to meaſure the extent of the vibration, after a blow given to the pen-

pendulum; one end of the ribbon being faſtened to the loop-hole of the rod. The little inſtrument for drawing the ribbon through was thus made. I took a piece of thin plate braſs, about the ſize of a card, bent down ſquare about three quarters of an inch of its breadth, through which two holes were made, to faſten it by two ſmall wood ſcrews to the piece of wood mentioned; the other edge was bent down ſquare the contrary way for about half an inch of it, and cloſe to the part bent down, near one end of it, was a hole as long as the breadth of the ribbon, and a thin ſpring of braſs riveted to the other end of the part bent down, ſomething longer than the whole, in order to preſs it down by the finger, whilſt I put the ribbon thro' which was to draw tight betwixt the ſpring and the upper part. The machine thus compleated and faſtened to the piece of wood, and laid about twelve inches before the rod of the pendulum (to which was faſtened the ribbon) and drawn tight through the machine, and laid looſe on the floor, I put a pin through the ribbon, cloſe to the edge of the braſs next the pendulum, and fixed a reſt, to lodge the muzzle of the gun upon, at ſeven yards diſtance, in order to make every trial at the ſame diſtance, as well as to level it exactly at the center.

When I made the firſt experiment, I found the wood was too hard, as ſome of the ſhot rebounded from it; I therefore covered it with a piece of poplar plank, faſtened to the wood of the pendulum by a nail at each corner; which I found very convenient, as I could eaſily take it off after ſhooting many times at it, and fix on another piece, becauſe by often ſhooting at it the pendulum will become heavier, which would cauſe ſome difference in the experiments, unleſs allowed for.

The

The first of the following experiments I made to try the difference of the force of powder, from a piece of two feet ten inches the barrel, the bore five-eighths; weight of the whole gun five pounds four ounces; with eighty grains of powder, and one ounce and a half of shot.

No. I.

	Inches.
The best double strong powder drew the ribbon out	18 1-half
Ditto	19 1-half
Powder bought at 16d. per pound,	12 1-half
Ditto bought at 20d.	16 1-half

No. 2. The same charge with a piece three feet three inches the length of the barrel, and six tenths the bore; weight of the whole gun five pounds twelve ounces.

The best double strong powder drew the ribbon out	27 1-half
Ditto	28 1-half
Powder at 16d. per pound	18
Ditto at 20d.	20

The trials made with the first gun were weaker, I believe, on account of the touch-hole being wider than usual; but the proportions are much the same, and agree nearly to the proportions in those experiments made in the former part with my powder trier; I say nearly, for exactness is incompatible with experiments of this kind.

No. 3. A gun two feet six inches the length of barrel, and six tenths bore; weight of the whole gun five pounds six ounces.

With 80 grains weight of powder and one ounce and a half of shot, drew the ribbon out	24
Ditto	25
Ditto with two ounces of shot	27
Do. with 92 grains powder and 2 ounces shot	30

No.

No. 4. Another gun two feet six inches the length of barrel, and five eighths bore; weight of the whole gun five pounds eight ounces.

	Inches
With 80 grains weight of powder, and one ounce and half of shot drew the ribbon out ——— ———	25 1-half
Ditto with two ounces of shot —	28
Ditto with 92 grains of powder and two ounces of shot ———	30 1-half
The gun, No. 2, with 80 grains powder and one ounce and half of shot, drew out ——— ———	25 1-half
Ditto with two ounces of shot —	29
Ditto with 92 grains of powder, and two ounces of shot —	31

Here it should be remarked, that though the ribbon was drawn out farther with two ounces of shot than one ounce and a half, and 80 grains weight of powder; yet as there was a fourth part more weight in the two ounces, so one fourth part of the inches measured on the ribbon should first be taken off, and then by comparing it will be found, that each single shot of the ounce and a half charge had the greatest velocity; the quantity of powder must therefore be increased in proportion to the addition of shot, to give each shot in the different charges the same velocity.

The number of inches drawn out and measured on the ribbon, will, I apprehend, be thought sufficient, by the greater part of my readers, for discovering the velocities that shot are thrown with from different guns, by comparing them with each other, or the force of different powders by the same comparisons. But if we be further curious to know the actual velocity given by the explosion of powder, that is, how many feet in a second the shot fly at first coming from the barrel,

rel; this requires a farther inveſtigation, which I ſhall endeavour to explain in the moſt eaſy method.

'The principle on which the machine here deſcribed is founded, is this ſimple axiom of mechanics; that if a body in motion ſtrike another at reſt, and they be not ſeparated after the ſtroke but move with one common motion; then the common motion is equal to the motion with which the firſt body moved before the ſtroke: whence, if that common motion, and the maſſes of the two bodies be known, the motion of the firſt body before the ſtroke is thence determined. Hence then, if the weight of the pendulum be known, and likewiſe the reſpective diſtances of its center of gravity, and center of oſcillation, from its axis of ſuſpenſion; it will thence be known what motion will be communicated to this pendulum by the percuſſion of the body of a known weight moving with a known degree of celerity, and ſtriking it at a given point. And hence, if a bullet or charge of ſhot of a known weight ſtrike the pendulum, and the vibration which the pendulum makes in conſequence of the ſtroke be aſcertained, the velocity with which the ball or ſhot moved is thence to be known.

'But in order to compute the velocity from the vibration of the pendulum after the ſtroke, it is firſt neceſſary to know the dimenſions of the pendulum.'

The weight of this whole pendulum was 32 pounds 1-half: its center of gravity was 42 inches diſtant from its axis of ſuſpenſion: and 55 of its ſmall ſwings were performed in a minute; whence its center of oſcillation (determined from hence) is

is 46 inches and near 3-4ths distant from that axis. The center of the piece of wood is distant from the same axis 49 inches; and to the loop where the ribbon is fastened is 96 inches from the same axis.

To find the center of oscillation, say, as the square of the vibrations is to the square of 60 (the vibrations in a minute) so is the length of a pendulum which beats seconds (viz. 39,2 inches) to the distance of the center of oscillation from the axis of suspension. Thus, as 3025 is to 3600, so is 39,2 to 46 3-4ths, the distance required.

'In a compound ratio of 49 to 46 3-4ths, and '49 to 42, take the quantity of matter of the 'pendulum, 32 1-half, and the fourth number 'will be 26 pounds nine ounces.' Thus, as 49 multiplied by 49 is to 46,75 multiplied by 42, so is 32,5 to 26 pounds 9 ounces, the answer required.

'Now geometers well know, that if the blow 'be struck in the center of the piece of wood, the 'pendulum will resist to the stroke in the same 'manner as if this last quantity of matter, 26lb. '9 oz. were concentrated in that point, and the 'rest of the pendulum taken away. Whence 'supposing the charge of shot impinging round 'that point to be two ounces, (or nearly 1-212th 'part of this quantity of matter) the velocity of 'the point of oscillation after the stroke (by the 'laws observed in the congress of such bodies as 'rebound not from each other) will be 1-212th of 'the velocity the body of the shot moved with 'before the stroke.'

'The velocity of the point oscillation, after the 'stroke, is easily deduced from the chord of the 'arch, through which it ascends by the blow: 'for it is a well known proposition, that all pen-

'dulous

'dulous bodies aſcend to the ſame height by their 'vibratory motion, as they would do, if they 'were projected directly upwards from their loweſt 'point, with the ſame velocity they have in that 'point. Wherefore if the verſed ſine of the aſ-'cending arch be found (which is eaſily deter-'mined from the chord and radius being given) 'this verſed ſine is the perpendicular height to 'which a body projected upwards with the velocity 'of the point of oſcillation would ariſe: and con-'ſequently what that velocity is, can be eaſily 'computed by the common theory of falling bo-'dies. For inſtance; the chord of the arch de-'ſcribed by the aſcent of the pendulum after the 'ſtroke, meaſured on the ribbon, has been ſome-'times 28 inches; the diſtance of the ribbon 'from the axis of ſuſpenſion is 96 inches.' Then proceed from 28 in the ratio of 96 to 49. Thus, as 96 is to 49 ſo is 28 to 14 1-3d, the chord of the arch through which the center of the board aſcended after the ſtroke. Now to find the verſed ſine of an arch, whoſe chord is 14 1-3d, and radius 49, ſay, as 98 (the duplicate of the radius) is to 14 1-3d ſo is 14 1-3d to 2,2.

Now the velocities acquired by falling bodies are as the ſquare roots of the heights fallen from: and as a body falls by its gravity 16 feet 1-12th in one ſecond, and acquires a velocity to carry it uniformly through 32 feet 1-6th, or double the former ſpace in a ſecond; we have, as the ſquare root of 16 1-12th, or the ſquare root of 193 inches, is to 32 1-6th; that is, as 13,9 is to 32 1-6th ſo is 1,49 to near 3 feet in a ſecond, the velocity which would carry a body to this height; or, which is the ſame thing, the velocity which a body would acquire by deſcending thro' this ſpace.

'To

'To determine then the velocity, no more is 'neceſſary than to multiply 3 by 212, and the 'reſulting number, 636, will be the feet the 'charge of ſhot would deſcribe in a ſecond, if it 'moved with the velocity it had at the moment of 'its percuſſion. But this velocity is to be in-'creaſed in the duplicate ratio of the diſtance of 'the points of oſcillation and percuſſion from the 'axis of ſuſpenſion. That is to ſay, as the ſquare 'of the oſcillation diſtance is to the ſquare of the 'percuſſion diſtance, ſo is the velocity here found 'to the true velocity.' Thus, as 2186 is to 2401, ſo is 636 to 695 feet in a ſecond, the actual velocity.

'And ſince the length of the ribbon drawn is 'always nearly the chord of the arch deſcribed 'by the aſcent, and theſe chords are known to 'be in the proportion of the velocities of the 'pendulum acquired from the ſtroke; it follows, 'that the proportion between the lengths of rib-'bon drawn out at different times, will be the 'ſame with that of the velocities of the imping-'ing ſhot, and conſequently, by the proportion of 'theſe lengths of ribbon to 28, the proportion of 'the velocity with which the ſhot impinge, to the 'known velocity of 695 feet in a ſecond, will be 'determined.' Suppoſe it be required to find how many feet in a ſecond the ſhot impinged with to draw the ribbon out 20 inches; ſay, as 28 is to 695, ſo is 20 to 460 feet, the anſwer.

Whilſt I was making the experiments at the pendulum, it came into my mind, that the proportionate velocities with which ſhot be thrown from guns of different lengths and bores, might be diſcovered by ſhooting at a maſs of ſtiff-tempered clay, at ſuch a diſtance, that a ſufficient number of the ſhot might be thrown into the maſs,

mafs, to take a medium of the depths they were ſunk into the clay. I therefore formed a cube of clay, cleared from ſtone, and well beaten, as ſtiff as poſſible to be found; this having ſix ſides, afforded opportunity for ſix ſhoots, either from different guns or with different charges, from which I made the following experiments.

Some experiments made to try the velocity or force of ſhot, by firing at a maſs of ſtiff-tempered clay at thirty-five yards diſtance.

No. 3. A gun two feet ſix inches the barrel; the weight of the whole gun five pounds ſix ounces; the bore ſix tenths diameter.

Powder.	*Shot.*		*Sunk deep.*	
Grains.	Oz.	Qrs.	In.	8ths.
80	1	1	1	3
—	1	2	1	2
—	2	0	1	0
—	2	2	0	7
—	2	0	1	1

No. 5. A Spaniſh barrel three feet five inches; weight of the whole gun was ſix pounds, and ſix tenths of an inch bore.

Powder.	*Shot.*		*Sunk deep.*	
Grains.	Oz.	Qrs.	In.	8ths.
80	1	1	1	2
—	1	2	1	2
—	2	0	1	2
—	2	2	1	1
—	2	0	1	1 half

The depth of the ſhot-holes made in the clay in the above experiments was taken as nearly as I could at a medium: for they were not all of a depth at each ſhoot; which I attributed partly to the inequalities of the ſhot, though of the ſame number, and partly to ſome ſmall ſtones that might

might be left in the clay, tho' it had been well picked and tempered. I therefore cut the clay into thin ſlices, dried it, beat it in a mortar, and ſifted it, then wrought it again into a maſs, which was well beaten, and formed into a cube of about ſix inches diameter. This maſs was not ſo ſtiff as the laſt; which I ordered purpoſely that the ſhot might ſink farther into it. The experiments made with it were as follow. The wad uſed in theſe experiments was ſtamped out of liſt.

No. 4. The gun two feet ſix inches the barrel, ſix tenths bore, and weight of the whole gun five pounds eight ounces, being opened a little towards the breech.

Powder.	*Shot.*		*Sunk deep.*	
Grains.	Oz.	Qrs.	In.	8ths.
80	1	1	2	3
—	1	2	2	2
—	2	0	2	0
—	2	2	1	6
—	2	opaper wad	2	0

No. 6. A gun three feet five inches the barrel, five eighths bore, weight ſeven pounds and one quarter.

Powder.	*Shot.*		*Sunk deep.*	
Grains.	Oz.	Qrs.	In.	8ths.
80	1	1	1	7
—	1	2	1	7
—	2	0	1	6
—	2	2	1	6
—	2	opaper wad	1	2

Though in theſe experiments the ſhot were ſunk deeper into the clay than in the former, the depth was not more regular; ſo that I prefer clay that is tempered as ſtiff as is compatible with making a ſound maſs of it.

I or-

I ordered another mafs of clay to be tempered very ftiff, to try two guns at of a larger bore; but firft made one fhoot with the gun No. 3, by way of ftandard to refer to.

The gun No. 3, with 80 grains of powder and two ounces of fhot, at 35 yards, funk into the clay ——— 1 1-4th

One, No. 7, the barrel two feet feven inches and 6-8ths bore, with the fame load, weight of the gun fix pounds 1

Ditto with 92 grains of powder and two ounces and a half of fhot 1

A gun, No. 8, the barrel three feet fix inches and 6-8ths bore; weight of the whole gun 6 pounds 12 ounces, with 80 grains of powder and 2 ounces of fhot 1 1-4th

Ditto with 92 grains of powder and two ounces and a half of fhot - 1 1-8th

In the experiments made with the guns two feet fix and three feet five inches at the firft mafs of clay, there appears to be no difference in their velocities, though the barrels were of the fame bores. I therefore conclude the fmall barrel to be the beft.

In the experiments made at the fecond mafs of clay, the barrel three feet five inches being the largeft bore, to try it fairly, it ought to have had a greater load; for the fhoots from that of two feet fix inches are greatly fuperior.

From the experiments made at the third mafs of clay, that a barrel two feet feven, fix-eighths bore, did not throw the fhot with fo much force by one fifth part with the fame load; and that when half an ounce of fhot was added to the charge, it required twelve grains weight of powder to give the fame velocity the fhot had from the former charge.

That

That the barrel three feet six inches and six-eighths bore, threw the shot with only the same velocity as the barrel two feet six inches and six-tenths bore. So that there appears to be no other advantage in shooting with these larger bored barrels, than their carrying a larger load. Whereas, 92 grains weight of powder and two ounces and a half of shot, seems to be as much as any man will care to stand against.

I could with pleasure have made more experiments, both at the pendulum and clay: but my health at this time could not permit it. However, as the method for both are here fully given, every one may satisfy himself with as great a variety of experiments as he pleases: and I doubt not but it will afford more pleasure to those who have leisure, than many other trifling diversions, in which men often waste their time.

As the consideration of the resistance of the air is of the greatest importance to the perfection of gunnery; I think it would be a culpable omission not to say any thing on that head, tho' of no great consequence in shooting flying: because few persons will use so large a quantity of powder in proportion to the charge of shot, as to have it retard instead of increasing their velocities.

Mr. Robins, from computations confirmed by succeeding experiments, makes it appear, 'that 'a leaden ball of 3-4ths of an inch diameter, and 'weighing nearly 1-3d oz. avoirdupoize, if it be 'fired from a barrel of 45 inches in length, with 'half its weight of powder, will issue from that 'piece with a velocity, which if it were uniformly 'continued, would carry it near 1690 feet in one 'second: and that the resistance of the air on a 'bullet first moving with that velocity amounted 'to 10 pounds, which is 27 times its own weight.

That

'That an iron bullet weighing 24 pounds, if fired 'with 16 pounds of powder (which is usually esteemed its battering charge) acquires a velocity 'of about 1650 feet in a second, scarcely differing from the other. Whence, as the surface 'of this last bullet is more than 54 times greater 'than the surface of a bullet of 3-4ths of an inch 'in diameter, and their velocities are nearly the 'same; it follows, that the resistance on the larger bullet will amount to more than 540 'pounds; which is near twenty-three times its 'own weight. And if the charge of powder be 'increased, the resistance of the air will be increased; consequently, though increasing the 'charge of powder will increase the velocity of 'the shot, 'till the powder arrive at a certain 'quantity; yet after this if the powder be increased, the velocity of the shot will decrease.'

The shot generally made use of by sportsmen for shooting flying, are No. 3. No. 4. No. 5. and No. 6. and are in the proportion of 300, 400, 500, and 600, in every two ounces of shot of each number; which is a very proper load for a birding-gun of a middle sized bore. Now the smallest of these numbers are made use of by some, on account of their flying thicker, and thereby having the greater chance of disabling the wing. But as birds are so frequently lost when only winged; and if only three shot take place in the body of the bird, it will be more certain of killing the bird than six of the smaller ones; I believe the advantage will be in those of the larger size: but No. 4. will do very well 'till Michaelmas for partridge shooting; after which time No. 3. I should think the best: because birds will then fly stronger, and are not so easily brought down with those of No. 4.

The proportions of the surface of a single shot of each of these numbers are nearly,

As	7,3681	6,0822	5,2415	and 4,6415
Which multiply'd by	300	400	500	600
Give	22,1045	24,3288	26,2075	27,8490

the proportions of the resistance upon the charge of two ounces: for these last numbers express not the absolute quantities of the surfaces, but the proportionate quantities of surface of 3, 4, 5, and 6 hundred shot to each other. By comparing which it appears, that there is so great a difference as 1-4th of surface more on the charge of No. 6. than there is on the same charge of No. 3; consequently the resistance of the air is so much greater on No. 6; and as there is but half the quantity of matter in each shot, their velocity is not half so great as those of No. 3: which must, I think, be sufficiently clear to those who consider it.

It is well worth while for any person to satisfy himself by making several shoots from the same gun, at a cube of clay at different distances, at 20, 30, or 40 yards, with a proper load of powder and shot of No. 3: and then repeat the same trials at the other three sides of the clay, with the same gun and load at the same distances, but with shot of No. 6: taking the medium of the depth of the shot holes from each shoot: or he may make the like experiments with shot of other sizes, and at any distances he like, by comparing of which he will be able to determine what sort of shot will best suit his purpose.

The resistance of water is 850 times greater than that of air: and by encreasing the velocity, it will sometimes resist as much as a solid. I shall give the following remarkable experiment, mentioned by Dr. Desaguliers, to confirm the assertion.

tion. A ſail was ſpread horizontally in a pond, about two feet and a half under the ſurface of the water; and a muſket with a ſmall charge being fired obliquely to the ſurface of the water, but perpendicularly to an half-inch deal board fixed under the water over the ſail; the bullet went through the board under the water, and after that through the ſail-cloth. The experiment was made again with a greater charge; and the bullet ſtruck againſt the board, without going through it, making but a ſmall impreſſion in the board; yet its roundneſs was alter'd more than the reſiſtance of the board ſeemed likely to have cauſed; and therefore the bruiſe in the ball was thought owing to the reſiſtance of the water. Upon increaſing the charge a third time, the ball fell upon the ſail, without reaching the board, and was much beaten out of ſhape. At laſt putting in a charge nearly equal to the proof, (that is, the weight of powder equal to the weight of the bullet) the bullet was beaten to pieces upon the ſurface of the water.

This great reſiſtance of water was further confirmed by an accident which happened in firing off ſome water-rockets (upon the Thames) whoſe property is to go under ſeveral times, and riſe again, and at laſt burſt above the water. One of them in its laſt riſe ſtopping under the middle of a barge, broke there, and made ſo great a hole in the barge's bottom, that there was only time for the company to ſhift into another barge which was near, and the waterman to row aſhore from the middle of the Thames at Mortlake, (where it is but narrow) before the barge was half full of water. Here the water reſiſted like a ſolid; and conſequently the powder made its way thro' the wood which was leſs denſe and not very thick.

AN

AN ADDITIONAL APPENDIX CONCERNING DOGS.

THE perfection of a dog depends not only on the beauty of his form, his ſtrength and agility, but on his interior qualities: When the latter be improved by proper training and inſtruction, he becomes an uſeful companion to man, to aſſiſt in his deſigns, to watch his ſafety and defend him. A motion of the hand, or even of the eye, is ſufficient to make him underſtand the will of his maſter, which he inſtantly purſues with eagerneſs, courage, and fidelity.

It is not my intention to write a hiſtory of dogs, nor can it be expected one could be given in a few pages. My preſent deſign, then, is only to give a deſcription of ſuch dogs as are moſt ſerviceable for a ſportſman to ſhoot with, and to point out the method which experience has taught, and is approved of by all ſportſmen, for training, breaking and managing them. And as my Art of Shooting Flying has been fortunate enough to meet with a general approbation, I have added this additional appendix to render that treatiſe

treatise as useful as possible to those who delight in that diversion.

And first of POINTERS.

SECTION I.

AS nothing has yet been published on these dogs (at least that I have met with) I am inclined to think that they were originally brought from other countries, though now very common in England. Their great utility and excellence in shooting partridges, moor or heath game, which make them worthy our regard, are well known. There is so great a variety of pointers of different *make* and *size*, and *some* good of each kind, that it is no wonder men should differ in their opinions concerning them. The pointers I best approve are not small, nor very large; but such as are well made, light and strong, and will *naturally* stand. A small pointer, though ever so good in his kind, can be but of little service in hunting, particularly through a strong piece of turnips, broom or heath; and the feet of a large heavy dog will soon be tired by his own weight. 'Tis proper for a young sportsman to purchase a dog that is well broken, and to enquire the method and words he has been used to by his former master in *breaking and hunting with him*; otherwise the dog will have a new lesson to learn, which will be a great disadvantage both to him and his master. But if a young sportsman is desirous of breaking his own dogs, the following is the method I advise.

Having made choice of a whelp of a known good breed, begin when about three or four months

months old *to teach him* to couch at a piece of bread, causing him to lie whilst you walk round him at some distance, and come nearer to him by degrees: When he has lain as long as you think proper, reward him with the piece of bread and *speak kindly to him*. Teach him to fetch and carry, to bring a glove or a bird of any sort after you, always observing to cheer him with kind expressions when he does well, and check or speak roughly to him when he does not obey. Use him to obey by whistle and signs as much as possible; for it is a bad way to make more hallooing in the field than is necessary. When you chastise him, it should be with a whip, so as to make him remember it, using a rough voice at the same time; but the chastisement should not be too severe, and the words you use to him as few as possible; since he may be supposed better to understand the sound than the language. When he is about five months old use him frequently to be tied up, and let him off his chain for half an hour or an hour morning and evening. It is best to give him his lessons in a morning before you feed him; this should be done chiefly with your own hand, that it may seem as a reward, the more to endear you to him; but do not overfeed him. Take him out whenever you walk, sometimes leading him in a string, suffer him to go a little before you, and sometimes behind; but when loose never suffer him to go far from you, unless you hunt with him, and oblige him to come to you at the word *back* or *here*; train him thus by continual lessons, till his attention is always on you to know what he is to do.

It will not be amiss frequently to fire off a little powder, and to make him lie down whilst you load again, which will not only teach him to stand

ſtand fire (for many dogs will at firſt quit the field on the diſcharge of a gun) but will alſo make him acquainted with this very neceſſary part of his buſineſs in the field; from the neglect of which he would frequently ſpring birds whilſt you are loading.

At ſix, ſeven, or eight months old (for all dogs will not begin to hunt alike early) take him into the field in pairing time, or the latter end of Auguſt, and if you have an old ſtaunch pointer, take him with you at firſt to teach, or rather encourage the other to hunt off. When your old dog makes a point, if the young one be not near, bring him up by degrees till he ſpring the birds, and let him enjoy the ſcent; which will encourage him to hunt. When you find he knows birds and will hunt, it is beſt to take him out alone: obſerve which way the wind lies, and if you can conveniently, enter on that ſide the piece you intend to hunt in which is oppoſite the wind, and do not ſuffer your dog to go in before you; caſt him off to the right or left croſs before the wind, walking ſlowly the ſame way 'till he be got to the ſide of the piece, then whiſtle or give the word *back*, at the ſame time walking the contrary way, pointing with your hand the way you would have him go; bring him back till he comes to the other hedge or ſide of the field; advancing forward ten or twelve yards every time he croſſes you. Repeat this till you have regularly hunted the whole field, by which means you will certainly find birds if there be any. When he points, walk up to him, and go forward ſlowly towards the bird; when you think you are within a few yards of them, if they lie and your dog be ſteady, walk in a circle round them, coming nearer by degrees till you ſpring the birds. If your dog run after them

them (as moſt young dogs will do) check him with rough words; but if he continues doing ſo you muſt chaſtiſe him ſmartly with your whip till you break him of that fault. It is very common with young dogs that will ſtand at firſt, afterwards to break in and ſpring the birds; which you muſt never indulge him in. Put a few ſmall ſtones in your pocket, and when he ſtands endeavour to head him, that is, to get before him, holding up your hand with a ſtone ready to throw at him, to deter him from ſpringing the birds, whilſt you can walk round him; or if it be convenient, take a perſon with you on horſeback, and when your dog commits a fault, or does not obey your call or whiſtle, let him ride after and whip him; and at the ſame time if you whiſtle or call, he will naturally come to you for protection. Thus he will learn to come to you, as he always ſhould do, when he has committed a fault; for if he was puniſhed ſeverely by yourſelf, you would find he would not come near you when he knew he had done wrong; which would make it difficult to break him; but if this method be obſerved, by harſh words and moderate correction, he will ſoon get the better of the foible and become ſtaunch. When he commits a fault, command your temper in correcting him, and let it be without paſſion, and let no fault provoke you to kick or ſtrike ſo as to hurt him. I have ſeen an irrecoverable miſchief done from a kick, when the laſh of the whip would have had a better effect.

The breed of pointers which has been mixed with Engliſh ſpaniels, ſuch as are for ſetting-dogs (in order to have ſuch as will run faſt and hunt briſkly) are, according to the degree of ſpaniel in them, difficult to be made ſtaunch, and many of them never will ſtand well in company. The

method already given is the moſt likely to ſucceed with theſe: but I by no means adviſe a young ſportſman to meddle with ſuch. If you find your dog refractory, and cannot eaſily make him ſtand, yet find ſome good qualities that induce you to take a good deal of trouble with him (ſuch as a very extraordinary ſagacity in ſcent, and that of a ſtrong bold hunter) when he knows birds well you may hunt him with a leather ſtrap three or four yards long faſtened to his collar, which by his treading on it frequently will ſhorten his ſpeed, and render him the eaſier to be ſtopped. Some will hunt with a collar lined with another, thro' which ſeveral clout-headed nails are put, the points inward, and a line faſtened thereto; which will not only check his running too faſt, but when he ſtops, if the line be long enough for you to get ſo near as to ſet your foot on, or take hold of it, if he bolts forward he will be pricked ſo as to make him remember it, and will endeavour to avoid a repetition of that puniſhment. You muſt be very ſtrict with him, and not hunt him in company with any other dog till he be quite ſtaunch: it often coſts a great deal of trouble to make him ſo; but ſuch dogs, when broken, do often turn out the beſt.

Some are of opinion that the way to make pointers ſtand well in company is, when they are young to take them out conſtantly with old ſtaunch dogs, and they will learn by degrees to ſtand both with or without company. But unleſs he is of a breed known to ſtand naturally, you will find more difficulty in breaking a vicious dog in company than by himſelf.

It is alſo common not to begin to enter pointers till near a year old, becauſe uſing them very young ſhortens their ſpeed. Suppoſe there is truth in this

this maxim, and your dog ſhould not hunt altogether ſo faſt, a ſufficient amends will be made for his want of ſwiftneſs, by hunting more carefully, *nor will he run* upon birds, or paſs them unnoticed, as dogs which *run very faſt* are apt to do.

One good pointer in the field at a time, if you have patience to attend him, will be ſufficient for two men to ſhoot from; but if you have an old ſpringing ſpaniel, that is ſo well under command that you can always keep him near you, ſuch a dog may be uſed with your pointer with great advantage, as he will better find birds that are wounded, and alſo ſpring ſuch as are near you, which you otherwiſe might paſs. But if you ſhould be fond of hunting many pointers together in a field, as is frequently done, you ſhould not have more than one amongſt them who has been taught to fetch his game, leſt by endeavouring to get it from each other they ſhould tear it.

Two perſons in the field with guns are better than more at partridge-ſhooting; who ſhould with patience pay a due attention to each other. When your dog points walk up without any hurry, ſeparating a few yards one to the right and the other to the left of your dog. If a covey ſprings, never ſhoot into the midſt of them, but let him on the left ſingle out a bird which flieth to the left, and him on the right a bird to the right, that you may not interrupt each other, nor both ſhoot at the ſame bird, "and readily let fly at the firſt aim." Let each of you mark the fall of his bird, and immediately run to the place; and if the dog does not ſecure it, or the bird ſhould be only wounded and have run, put him upon the ſcent; but if your dog underſtand his buſineſs, and will fetch his game, it is better to

truſt to him and load again as quick as you can. It will always be of great uſe and ſave much time and trouble, to have a perſon without a gun to mark the flight of the birds.

If a ſingle bird be ſprung, let him take the ſhoot to whoſe ſide it flies: the bird being killed, cauſe your dog to lay by it whilſt you load, leſt he ſpring other birds that are near you.

If you trace the birds to a hedge, double the row by walking one on each ſide, taking your dog on the ditch ſide: here if you have a ſpaniel he will be of great uſe; as you may make him go along in the ditch, and your pointer on the other ſide; by which means you will not paſs a bird, and one of you will moſt likely get a good ſhoot at it. Your own judgement, with very little experience, will beſt direct where the birds are moſt likely to be found at different times of the day, according to the grounds you have to hunt in.

Of PHEASANT and WOODCOCK ſhooting.

Pheaſants or Woodcocks generally lie in carrs or woods where there is much cover. Spaniels are therefore the dogs moſt proper for this kind of ſhooting. Some pointers indeed that are bold ſpirited and have been a great deal uſed to this work, will follow a pheaſant very well; but from the generality of ſlow ſtaunch pointers a pheaſant will get off ſo faſt, as when ſprung to be out of the reach of gun-ſhot; beſides they are not hardy enough to go into thick cover.

The ſpaniels proper for this work are of a middling ſize, their legs rather ſhort and very ſtrong: they muſt be hardy, able to bear great fatigue, diſpoſed to go into cover freely and undaunted, to hunt very briſkly and yet to go very ſlow when upon

upon ſcent of game. You cannot begin too early with theſe dogs, to teach them to fetch a bird and bring it after you: which will prevent their getting a habit of tearing or breaking the game. One of this kind muſt be always obliged to lay down whilſt you load: and as his buſineſs is to ſpring game, you ſhould never ſuffer him to go above ten or fifteen yards from you; and therefore take him out with others that are brought under command as ſoon as he is able to hunt. For to have good ſpaniels, they muſt be uſed a great deal. If you find any difficulties in keeping him to hunt near you, put one of his feet into his collar, and hunt him ſo for an hour or two. Frequent repetitions of this puniſhment will bring him to a ſenſe of his duty. One, two or three brace of ſpaniels well broken, may be uſed together; and they will find work enough in a large wood or thick cover. If two perſons intend hunting in a wood, it is beſt for one to go round it on the outſide firſt, whilſt the other goes oppoſite to him a little way into the wood, and afterwards to ſink in deeper as you ſhall find occaſion: unleſs you know the moſt likely part to find game in; in which caſe you may hunt the interior part firſt. Some perſons when they want to hunt a very large wood approve of taking a brace of high mettled ſpaniels that have not been broken, to hunt cloſe, and turn them into the middle of the wood; whilſt they with their well broken ſpaniels hunt outwards. But I am of opinion that unleſs you have any extenſive woods to hunt, that ſuch dogs are more likely to hinder than add to your ſport; that it will be better to hunt with patience with only ſuch dogs as are under good command, let the woods or cover be ever ſo large.

SEC-

SECTION II.

RULES *to be obſerved for keeping* DOGS *in Health.*

AS pointers and ſpaniels, when good of their kind and well broken, are very valuable to a ſportſman, it is worth while to take ſome care to preſerve them in health. This very much depends on their diet and lodging: frequent cleaning their kennels and giving them freſh ſtraw to lie on is very neceſſary; or in ſummer time, deal ſhavings inſtead of ſtraw, or ſand in hot weather will check the breeding of fleas. If you rub your dog with chalk, and bruſh and comb him once or twice a week, he will thrive much the better; the chalk will clear his ſkin from all greaſineſs, and he will be the leſs liable to be mangy. A dog is of a very hot nature: he ſhould therefore never be without clean water by him, that he may lick when he is thirſty. In regard to their food, carrion is by no means proper for them. It muſt hurt their ſenſe of ſmelling, on which the excellence of theſe dogs greatly depends. Barley-meal, the droſs of wheat-flour, or both mixed together, with broth or ſkim'd milk, is very proper food. For change, a ſmall quantity of ſcraps from which the tallow is preſſed by the chandlers, mixed with their flour, or ſheep's feet well baked or boiled, are a very good diet, and when you indulge them with fleſh it ſhould always be boiled. In the ſeaſon of hunting your dogs, it is proper to feed them in the evening before, and give them nothing in the morning you take them out, except a little milk. If you ſtop for your own refreſhment in the day,

you

you ſhould alſo refreſh your dogs with a little milk and bread. It has already been obſerved, that dogs are of a hot conſtitution; the greateſt relief to them in the ſummer, is twitch graſs or dog graſs, which is the ſame thing. You ſhould therefore plant ſome of it in a place you can turn them into every morning; they will feed freely on it, be cured of the ſickneſs they are ſubject to, and preſerved from any extraordinary heat of the blood; but unleſs the graſs be of this ſort, it is of no effect. If you be not acquainted with it, any gardener can furniſh you with enough to plant, as it is a nuiſance to them, and its roots run ſo quick through the ground as to injure their crops.

On the MANGE and its CURE.

Dogs are ſubject to the mange from being fed too high, and allowed no exerciſe, or an opportunity of refreſhing themſelves with dog graſs, or by being ſtarved at home; which will cauſe them to eat the vileſt ſtuff abroad, ſuch as carrion, or even human excrement: either of theſe will heat their blood to a great degree, which will have a tendency to make them mangy. The cure may be effected by giving ſtone brimſtone powdered fine, either in milk or mixed up with butter, and rubbing them well every day for a week with an ointment made of ſome of the brimſtone and pork lard, to which add a ſmall quantity of oil of turpentine.

Another medicine. Boil four ounces of quickſilver in two quarts of water to half the quantity, bathe him every day with this water, and let him have ſome of it to lick, 'till the cure be perfected. Or a ſmall quantity of troopers ointment rubbed on the parts on its firſt appearance, will cure it.

It

It will alſo free louſy puppies from their lice. Or Euphorb. Album two ounces, flour of ſulphur, Flanders oil of bays, and ſoft ſoap, each four ounces. Anoint and rub your dog with it every other day; give him warm milk and no water. The cure will be performed in about a week.

On Poison and its Cure.

If you ſuſpect your dog to be poiſoned with Nux Vomica (the poiſon commonly made uſe of by warreners, which uſually cauſes convulſive fits and ſoon kills;) the moſt effectual remedy, if immediately applied, is to give him a good deal of common ſalt; to adminiſter which, you may force open his mouth, and put a ſtick acroſs to prevent his ſhutting it, whilſt you cram his throat full of ſalt, at the ſame time holding his mouth upwards; and it will diſſolve ſo that a ſufficient quantity will be ſwallowed to purge and vomit him. When his ſtomach is ſufficiently cleared by a free paſſage obtained by ſtool, give him ſome warm broth frequently, to prevent his expiring from faintneſs; and he will recover. This ſucceſs I have experienced. I have alſo met with this preſcription. As ſoon as you ſuſpect your dog to be poiſoned, give him a common ſpoonful of the oil of Engliſh pitch, if a large dog, or in proportion if a leſſer; which, 'tis ſaid, will carry off the malignity of the poiſon the ſame day. But of this medicine I have not had an opportunity of making trial.

To deſtroy WORMS in Dogs.

Dogs are frequently troubled with worms; but more particularly whilſt they are young. Any thing bitter, is ſo nauſeous to theſe worms, that they are very often voided by taking two or three purges

purges of aloes, or (which is the ſame thing) Scots pills, four or five being a doſe for a large dog: this is to be repeated two or three times in a week. If this do not ſucceed, you may give him an ounce of powder of tin mixed up with butter, in three doſes, which ſeldom fails of cure. Or of the herb ſavin, dried and rubbed to powder, give about as much as will lay on a ſhilling for a doſe; which will entirely deſtroy worms and their ſeed.

On *Madneſs* and its *Antidote*.

As the human ſpecies are liable to this fatal and terrible malady from the bite of a dog or any animal that is mad, as much as they are from one another; it is well worthy our beſt care and endeavours to find out a remedy or antidote againſt its malignity. As ſoon therefore as you find your dog has been bitten or worried by any dog ſuſpected to be mad, diſſolve one pound of common ſalt, in a quart of warm ſoft ſpring or running water; and let him be well waſhed therewith: If he has received no wound, you need not be under any apprehenſion for the conſequence; but if there is any wound, you muſt ſqueeze and and bathe it well with your ſalt and water for half an hour, and bind a little ſalt upon the part for twelve hours; and give him the following medicine, which I am aſſured, by a very ingenious farrier, who has many times uſed it, never failed him of a cure.

The MEDICINE.

Take of rue ſix ounces, London treacle, garlick, ſage, and filings of pewter, of each four ounces: boil them in four pints of beer until half be waſted: the remainder to ſtand together till

uſed; the doſe is ſix common ſpoonfulls twice a day till the whole be given.

To *preſerve* the *Feet* of your *Dogs* from *Lameneſs*.

A pointer ought not to be hunted oftener than two or three days in a week: and unleſs you take care of his feet and give him good lodging as well as proper food, he will not be able to perform that through the ſeaſon. You ſhould therefore after a hard day's hunting waſh his feet with warm water and ſalt, and when dry waſh them with warm broth, or beer and butter, which will heal their ſoreneſs, and prevent a ſettled ſtiffneſs from fixing.

For *Strains*, *Blows*, or *Small Wounds*.

If your dog has received any little wounds by forcing through hedges, or gets any lameneſs from a blow or ſtrain; bathe the wound or grieved part with ſalt and cold vinegar (for warming it only evaporates the fine ſpirit) and when dry, if a wound you may pour in it a little Friar's Balſam, which will perform the cure ſooner than any method that I have experienced.

On *Coughs and Colds*.

Dogs are very ſubject to a cough, with a very extraordinary choaking, which is often thought to ariſe from a cold or ſome inward diſorder: and I think it is often occaſioned by their eating of fiſhes bones. To guard againſt it, order your ſervants to throw all ſuch fiſh bones where the dog can't get at them. But if the diſorder be from a cold, let bleeding be repeated in ſmall quantities if neceſſary; but if it be what is called *the diſtemper* in dogs, and they appear to be very low in ſpirits, bleeding is better omitted. Let meat

meat broth or milk broth warmed be the chief of his diet, and the following medicine. Take flour of sulphur, cold drawn linseed oil, and saltpetre, of each one ounce; divide it into four doses, giving him one dose every other day; and let him have plenty of clean straw to lie on. Or one spoonfull of honey daily.

These rules for the care and training of dogs are such as the course of my experience has suggested to me, without pretending to prescribe for others of more extensive practice and experience; but what is here delivered may not be unuseful to those who want some previous instructions in the affair.

FOR the information and satisfaction of my readers, I have here inserted abstracts of three late Acts of Parliament, relating to the game, viz. That of the 2d of George III. and that of the 10th of George III. for the better preservation of the game, and also the late Act of the 13th of George III. for the preservation of the moor game in England, whereby they, and sportsmen, may know the respective times when they are to begin, and when they are to leave off sporting, and also the penalties and punishments of infringing or breaking the above acts.

The aforesaid statute of the 2d of George III. for the better preservation of the game, enacts, That no person after the first day of June, 1762, shall upon any pretence whatsoever, take, kill, destroy, carry, buy, or have, in his, her, or their possession, or use, any partridge between the 12th of Feb. and the 1st of Sept. or any pheasant between the 1st of Feb. and the 1st of October, or any heath fowl, commonly called black game, between the 1st day of January and the

20th of Auguſt, or any grouſe (commonly called red game) between the 1ſt day of December and the 25th day of July in any year.* Perſons offending in any of the aforeſaid caſes, forfeit five pounds per bird to the proſecutor. The whole of the above penalties may be ſued for and recovered to the ſole uſe of the proſecutor with double coſts, and no part of the penalty ſhall be paid or applied to or for the uſe of the poor. Proſecutions to be brought within ſix months next after the fact committed.

N. B. By the above Act of 2d George III. the ſporting ſeaſon for partridges is, from the 1ſt Sept. to the 12th of Feb. both incluſive. And

For pheaſants, from the 1ſt of October to the 1ſt of February, both incluſive, and no other time. But hares are not included in the above act, they may be killed all the year, under the reſtriction in the following Act.

The Statute of the 10th George III. for the better preſervation of the game, enacts, That after the 24th of June, 1770, If any perſon ſhall take, kill, or deſtroy, any hare, pheaſant, partridge, moor game, heath game, or grouſe in the night, between one hour after ſun ſetting, and one hour before ſun riſing, or uſe any gun, dog, ſnare, net or other engine for taking, killing or deſtroying any ſuch game in the night as aforeſaid, every ſuch perſon ſhall for the firſt offence be committed to goal for any time not exceeding ſix months nor leſs than three, and be publicly whipped. And for the ſecond offence to be impriſoned not exceeding 12 months, nor leſs than 6, and be publicly whipped. And if any perſon ſhall upon a Sunday take, kill or deſtroy any hare

* See the Statute of 13th George III. for the preſervation of the Moor Game in page 77.

hare, pheaſant, partridge, moor game, heath game or grouſe, or ſhall upon a Sunday uſe any gun, dog, ſnare, net or other engine for taking, killing, or deſtroying any ſuch game as aforeſaid, and be convicted thereof upon the oath of one witneſs, ſhall forfeit and pay any ſum not exceeding 30l. nor leſs than 20l. One moiety thereof to go to the informer, the other to the poor of the pariſh. If no ſufficient diſtreſs can be had, the offender to be committed to goal for any time not exceeding ſix months, nor leſs than three.

N. B. By the above Act of the 10th George III. the time for ſporting is in the day time, viz. from one hour before the ſun riſes, until one hour after it ſets.

The late Act of the 13th George III. for the preſervation of the Moor Game in England, enacts, That from and after the 24th of June 1773, no perſon ſhall wilfully take, kill, buy, or have in poſſeſſion, any heath fowl, called black game, between the 10th of December and the 20th of Auguſt, nor any grouſe, called red game, between the 10th of December and the 12th of Auguſt, nor any buſtard between the 1ſt of March and the 1ſt of December in any year. After the ſaid 24th of June, if any perſon offends againſt the ſaid act, he forfeits for the firſt offence, upon conviction, any ſum not exceeding 20l. nor leſs than 10l. and for the ſecond, and every ſubſequent offence, any ſum not exceeding 30l. nor leſs than 20l. to be recovered in any of the courts at Weſtminſter, provided ſuch action be brought within ſix months after the offence is committed: And it ſhall be lawful for any perſon (except the perſon liable to pay the forfeitures) to proceed to recover theſe forfeitures by information upon oath, and conviction before any juſtice or juſtices of the peace,

peace, who are authorized to cauſe the ſame to be paid, and in caſe of neglect or refuſal, to levy the ſame by diſtreſs and ſale of the offenders goods, &c. by warrant, together with all coſts and charges, returniug the overplus to the owner, one moiety to be given to the informer, the other to the poor of the pariſh where the offence was committed: And in caſe no ſufficient diſtreſs can be had, ſuch juſtice or juſtices ſhall commit ſuch offender to the common goal or houſe of correction, there to be kept to hard labour for any time not exceeding ſix, nor leſs than three months, unleſs the money forfeited, and all coſts and charges on the proſecution, ſhall be ſooner paid. Appeals may be had at the quarter ſeſſions.

N. B. By this laſt mentioned Act of the 13th George III. for the preſervation of the Moor Game, the ſporting ſeaſon is,

For the Black Game, from the 20th of Auguſt to the 10th of December.

For Red Game from the 12th of Auguſt to the 10th of December. And

For Buſtards, from the 1ſt of December to the 1ſt of March, both days incluſive.

I have here alſo added an abſtract from the late Act of Parliament for preventing the ſtealing of dogs, which ſhews the great regard the legiſlature has to the canine race.

By the ſtatute of the 10th George III. for preventing the ſtealing of dogs, it is enacted, That after the 1ſt day of May, 1770, if any perſon ſhall ſteal any dog or dogs of any kind or ſort whatſoever, from the owner thereof, or from any perſon intruſted by the owner thereof with ſuch dog or dogs; or ſhall ſell, buy, receive, harbour, detain, or keep any dogs of any kind or ſort whatſoever, knowing the ſame to have been ſtolen

as aforesaid, every such person being convicted thereof upon the oath of one credible witness, before two Justices of the Peace, shall for the first offence forfeit and pay any sum not exceeding 30l. nor less than 20l. and the charges of conviction. And in case such penalty shall not be forthwith paid, the offender to be committed to goal for any time not exceeding twelve months, nor less than six, or until the penalty and charges are paid. Any person guilty of a subsequent offence to forfeit and pay any sum not exceeding 50l. nor less than 30l. together with the charges, which penalties to be paid, one moiety thereof to the informer and the other to the poor of the parish. On non-payment the offender to be imprisoned for any time not exceeding 18 months nor less than 12, or until the penalty and charges shall be paid, and be publickly whipped.

Justices to grant warrants to search for dogs stolen. And in case any such dog or dogs, or their skins, shall upon such search be found, to take and restore every such dog or skin to the owner; and the persons in whose custody any such dog or skin shall be found, are liable to the like penalties and punishments. Persons aggrieved may appeal to the Quarter Sessions, and the determination there to be final.

To make Gun Barrels of a fine Brown Colour.

AS a brown barrel seems to be the most pleasing to a sportsman, the following is a certain and easy method to perform it.

Rub your barrel bright with sand paper, or if bright scour it with dry brickdust to take off all greasiness, and fit a stick or piece of wood into the muzzle long enough to hold it by.

Bruise

Bruiſe roughly about half an ounce of ſtone brimſtone, and ſprinkle it over a gentle fire either of wood, or coal, or charcoal, hold your barrel over the ſmoke, turning and drawing it backward and forward until it be equally tinged all over; this done, ſet it in a cellar or damp wall 'till next day, in which time you will find it has thrown out a fine ruſt, over which you may draw your finger to ſpread it even alike, and let it ſtand another day. If you perceive any parts that have not taken the ruſt, you are to ſcour ſuch parts bright and repeat the above operation.

It is then to be poliſhed with a hard bruſh (which is firſt to be rubbed with bees-wax) and after with a dry woollen or rough linen rag, which will make it look of a beautiful brown colour. This rubbing muſt be repeated every day ſo long as it throws out any roughneſs. No oil or greaſe ſhould come on it for ſome time, as that may bring off the ruſt by places; but if by neglect it ſhould get ſo ſtrong a roughneſs that you cannot get it down with common rubbing, in that caſe wipe it over with ſweet oil and rub it off gently with a clean linen rag, and the next day you may poliſh it down with your bruſh as before directed.

Directions for keeping your Guns in order.

If your lock and furniture are bright, the beſt way to ſave the trouble, as well as prevent the damage that may be done by unſkilful poliſhing, is never to ſuffer them to ruſt, which may eaſily be prevented by frequently rubbing all the bright parts with a ſmall bruſh, dipped in ſweet oil, or gooſe greaſe which is better, which ſhould be well rubbed off with a linen rag; and this ſhould never be neglected both before and after uſing it.

It

It is needleſs to take the lock often to pieces, if you take it off and bruſh it with plenty of oil, and pull up the cock and hammer a few times, the dirt with the oil will work it itſelf out, which is to be wiped off and a little clean oil put on thoſe parts where there is any friction.

To *Waſh* out the *Barrel.*

Fill it either with cold or warm water, and empty it and let it ſtand a few minutes, and the air and moiſture will ſoften the ſoil left from the firing of the powder ſo as to come off the eaſier. You may uſe ſand with your rag or tow to waſh it out, which will remove any of the ſoil that ſticks hard to it without hurting its ſmoothneſs. Care muſt be taken to wipe it very dry, and if it is to be ſet by for a time, it will be proper to wipe it out with an oily rag and ſtop the muzzle with the ſame, otherwiſe it will be apt to ruſt.

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A

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